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The
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VOLUME XXXV OCTOBER 1921 NUMBER 4

New York's New Architecture

THE EFFECT OF THE ZONING LAW ON HIGH BUILDINGS

By AYMAR EMBURY II

THE law was framed to stabilize and conserve property values, to relieve the rapidly increasing congestion in the streets and on the transit lines, to provide greater safety in buildings and in the streets, and in general to make the business of the city more efficient and the life of the city more healthful and agreeable."

Thus writes George B. Ford, the Consultant of the Commission which framed the law. Nero doubtless wrote to much the same effect, after he had burned down some of Rome, for he found that the narrow streets of the old city were so jammed with the tenants of the six- or seven-story tenement houses that a considerable portion of the population of Rome was burned up; since many of these people were useful to him and since it was practically impossible for him to enjoy the spectacle of their death, he made and published a law which was not at all dissimilar from our "modern and novel" idea, prohibiting the construction of buildings of over stipulated heights in streets of given widths, and assigning definite areas to certain trades.

I have not happened to find what the people of Rome thought about their zoning law, and I do not suppose that what they thought mattered very much; but, amazing though it may seem, our law seems to be in a fair way to accomplishing its purposes, while the fears openly expressed by the Commission, that the law would work real hardship on some owners of real property, have fortunately been negligible—nor has the law interfered greatly with people who desired to alter or rebuild existing structures, mainly because the "use" districts were made as nearly as possible co-extensive with the sections of the city which had grown naturally into specialized districts of one sort or another. So this law, which was received very doubtfully, and considered as a radical experiment, has shown itself to be conservative in its action, and has awakened practically no active opposition. To the benefits anticipated by the framers of the law have been added others of considerable interest and importance to the architectural profession, which were certainly not obvious on the face of things. One cannot help suspecting that the architects on the committee must have perceived at least their possibility, although as these were æsthetic rather than practical, one can imagine that they were not particularly urged as reasons for the passage of the law since any purely æsthetic reason is received with suspicion and doubtfully regarded as a detriment by our sound business men. The first, and thus far the most obvious, result has been to increase greatly the possibilities of interesting treatment in the upper stories of high buildings; the second, which is as yet a tendency rather than an accomplishment, is to produce a certain unity in our street facades through the limitation of heights, and it is of these two factors that I wish chiefly to write.

The aspect of any city depends upon several unrelated factors, each of which may redeem what would otherwise be a very ugly place. Paris, for example, is generally cited as being a beautiful city, and in speaking of it, architects are apt to attribute its pleasing appearance to the uniformity of the cornice heights throughout the city and to the similarity in the design of the greater part of its buildings. My own opinion is that its beauty is largely due to the great number of trees which diversify its streets, and that Paris without the trees would be a dull, monotonous city, not so stupid as New York in the brownstone period, but not so much better, either. On the other hand, in New York we have to get along without any trees at all, so that our irregular street facades, with buildings of all conceivable sizes, utterly unlike in use, material, color, scale and precedent, are revealed in their raw disregard of one another's rights to artistic consideration. Trees would help the appearance of New York more than any zoning law, for these unfortunate discrepancies would be masked to some extent, but if our city is to be beautiful, we will have to depend on the buildings themselves.

Now the appearance of any city, or of any street

of a city, is dependent upon the appearance of the average of all the buildings which face it; an ugly street cannot be made beautiful by one or two beautiful buildings, nor destroyed by one or two architecturally ugly structures, although the influence on a neutral street of one or two examples of extreme excellence, or the reverse, is surprisingly potent for good or ill. Furthermore, it is true that entire uniformity, even of excellence, is not particularly inspiring, and is perhaps even less attractive than the unrelated conglomeration of buildings that forms our usual street facade in New York. The thing to be sought is rather variety within quite definite limits, and it is precisely this that the zoning law, plus the natural working of economic factors, is bringing about in New York.

The zoning law operates in two ways to bring this about: first in its definition of "use" districts, the segregation of manufacturing plants from retail dealers, and of both from the residence districts; and in the limitation of heights in various parts of the city and on various streets. The limitation of uses tends to uniformity, because each class of activity requires buildings of generally similar characteristics; but the natural desire for individuality keeps these buildings from being standardized to monotony; likewise the limitation on heights tends to establish a definite cornice line on any street within the limits of a height district, although it does not tend to establish uniform cornice heights within an entire district, since the height requirement is dependent upon the street width and not upon any arbitrary figure. Perhaps it should be explained that the law divides the city into districts, in each of which the allowable height of the street facade has a definite relation to the width of the street, this varying from street width to 2½ times the width of the street, so considerable variety of height is possible.

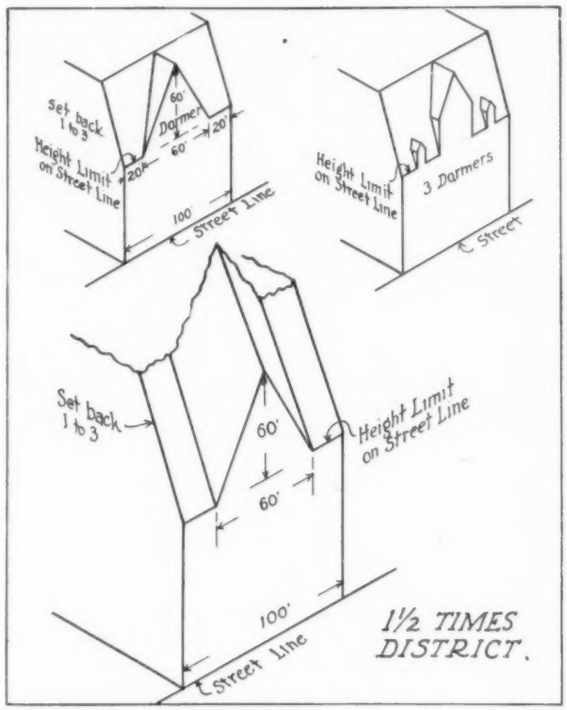


Diagram Showing Provisions for Dormers, New York Law

View of Heckscher Building, Looking North on Fifth Avenue
Warren & Wetmore, Architects

But the most interesting (to the architect) of all provisions of the zoning law is the peculiar and most effective manner in which heights are limited. The limit is not on the total height of the building but on the vertical height at the building line. Above that height, buildings may be extended providing that portions above the limiting height do not extend beyond a diagonal line drawn through the center of the street and the limiting height at the street line. Dormers of considerable extent are permitted, and other provisions of less, although very real, importance affect the height on the rears of lots, on courts, side streets, etc.

Roughly speaking, the law provides that above the height limit all structures must be contained within a cone of about 75° slope, so that a very large building may have considerable space above the height limit, while the small building has practically none. Here is

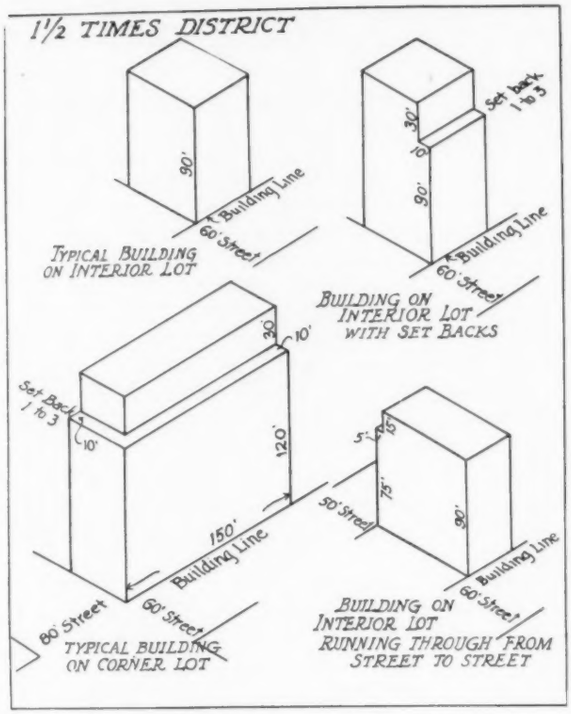


Diagram of Height Limits in 1½ Times Districts

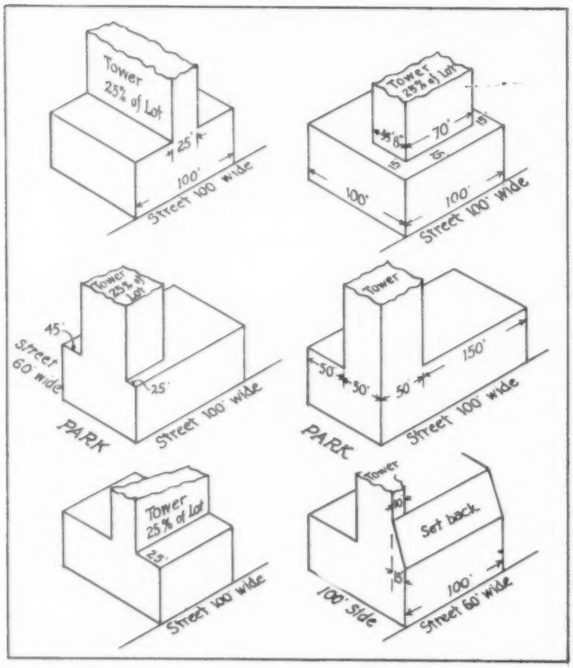
where the principal new architectural problem is found, a twofold problem in that very great skill in plan is needed to make it economically desirable to build small structures at great heights, with the necessary elevator service, and that once more our designers of New York buildings have an opportunity of designing in three dimensions instead of two—to design buildings and not facades.

From the economic point of view the problem is genuinely difficult; in the first place, it is obvious that the more floor space one is able to obtain, the more elevators are needed; floor space can be increased by adding stories, but additional elevators need area and decrease the available square feet of rentable space. It is also true that a given area on an upper floor requires more elevator capacity than the same area on a lower story, because of the time required to get to and from any considerable height; so that if we utilize our cone above the height limits to its fullest capacity, the upper story or two would contain nothing whatever but the elevator shafts.

Very few architects can or will design a structure with no reference to its appearance, so that the design of the stories above the height limit is generally a compromise between the silhouette which the architect wants and what seems economically best. The actual volume permitted by the law could be enclosed within slanting roofs were the maximum of space the sole consideration, but the multitude of small, superposed dormers required for lighting such space would be neither architecturally nor practically satisfactory. It would also be quite possible to step back each floor so that it comes within the limiting line, but this would be extremely difficult to manage in a satisfactory architectural manner, and the practical difficulties in such construction would make the cost incommensurate with the available office space obtained; the spacing of the main columns in the lower stories would have to be arranged primarily with regard to the loads at the top of the building and not for economical steel construction or convenient room arrangement on the principal floors, a thing manifestly impracticable. Thus far the buildings have been treated in a series of irregular steps, varying in height from one to five or six stories with the horizontal step-back generally equal to the column spacing.

It can be seen that on a square or symmetrical lot, or on a lot which is not excessively irregular, an exceedingly interesting terminal motive is possible; the problem offers a far wider range of treatments than did the facade on one or two streets, which used to be our problem, and the value to our skyline will be incalculable if for no other reason than because our buildings will be finished on all

View of Heckscher Building from East 57th Street
Warren & Wetmore, Architects



Principles Governing Design of Towers, from New York Zoning Law

sides, and not left with raw and naked sides and backs. Unfortunately, symmetrical lots are not always possible, and in such cases the architects are up against a problem not entirely dissimilar to the old problem of facade, since they are compelled to choose one facade, or rather one point of view, from which the building is most commonly seen, and to develop that appropriately, letting the back or the back and one side take care of itself. Carrere and Hastings and Shreve, Lamb and Blake had exactly such a problem in the Fisk Building, and very properly considered the northern side of the building, which can be seen from many parts of Central Park, and from Eighth avenue, Columbus circle, and Broadway nearly in full elevation, as of great importance and demanding a symmetrical treatment; while the south side of the building, which can be seen only at acute angles, and from certain rather restricted viewpoints, was comparatively disregarded. Even the satisfactory northern facade was possible only after a special ruling on the part of the authorities, for the design as finally executed technically violated the law, although practically it shut off less light and air from the surrounding properties than would a building which adhered literally to the restrictions of the Code. This was due to the boundary streets having different widths which would have imposed two cornice heights and created an unsymmetrical mass. The Commission accepted a solution in which the heights were averaged. Fortunately, the law permits deviations from its literal reading where such variations are manifestly for the public good, and the board is willing to consider these in a broadly intelligent manner; however the path to the board is purposely made difficult, so that it can be reached only if the object to be attained is of real importance.

The other building designed by Carrere and Hastings and Shreve, Lamb and Blake and illustrated in connection with this article, the Liggett Building on the corner of 42d street and Madison avenue, is situated on a piece of property of somewhat irregular shape, but of which a sufficient part is nearly enough symmetrical so that the portion of the building above the height limit can be treated as a symmetrical, tower-like structure. The height limit of this building occurred at the 16th floor, where the principal cornice of the building is placed, and the small tower-like corner extensions of the 16th story are made possible by the provision regarding dormers. The sloping limits of the cone enclosing the part above the height limits are tangent, or nearly so, to the cornice of the 16th floor and of the 22d floor. Above the 22d floor another step-back would have been necessary, but the architects evidently felt that the available office space, which would remain after the stairs, elevators, toilets, etc., had been deducted, would not repay the owners for further construction in height. It may be argued that only a portion of the battery of elevators need necessarily go higher, thus saving a certain amount of space; but the practical difficulties of operating only a few elevators to certain stories, and these for a comparatively small number of tenants, made further extension not worth considering.

The Heckscher Building is the latest of the New York structures to be completed under the provisions of the new Code, and, like the Fisk Building, was designed to be considered especially from the north, where it faces Central Park and is a very prominent object in the city skyline for several miles. The property on which this structure is built is of sufficient size so that the building could be agreeably designed from the sides as well as from the front, and the principle on which the building is stepped back is readily to be seen from the illustrations. In this case the cone enclosing the part of the building above the height limits is in part actually constructed as a roof of the tower, and the silhouette of the building is perhaps as attractive as that of any in the city with the exception of the Woolworth Tower.

The Ambassador Hotel is the only tall building constructed under the Code, other than an office or loft building, which occurs to me and since this hotel is on a lot which is in the main square but with the northerly Park avenue corner extremely narrow, the treatment of the upper stories in plan must have been much more difficult than would appear from the completed structure. Here only a comparatively small extension above the height limit was made, perhaps because the hotel was large enough for economical operation without additional rooms, or more probably because the more or less complicated plan of the modern hotel made it im-

practicable to raise the structure very much and still give proper rooms. It can readily be seen that an office building offers a much easier problem in this connection than a hotel or an apartment house, since in very large offices a considerable amount of artificially lighted space can be used without inconvenience for storage, for foyer halls, or other purposes of that kind, so that the total thickness of the mass of the building may easily be 60 to 80 feet, while in hotels or apartment houses, where all rooms must have outside light, the thickness of any wing will be determined by the width of two rooms plus the necessary corridor and elevator space, etc. This will amount, as a rule, to not over 44 feet, and it is impossible to get a step-back of more than one or two stories which will comply with the law and which will leave space for rooms.

The architectural treatment of the tall building has never had the final word said about it. The Woolworth Building, perhaps the finest example of tall building in America, is, as far as its exterior treatment goes, more expensive than is commercially practicable for the average building; nor is this expense entirely unnecessary to the result, since the great difficulty of architectural composition in the tall building is that the window openings themselves are extremely small as compared with the mass of the building and the frequent duplication of small openings with narrow piers between, on a mass of great bulk, is extremely difficult to handle in any of the traditional styles excepting Gothic, and that is obviously the most expensive style in which to work. In the classic styles the proportion of openings must bear some definite relation to the size of the order employed, and the architects of tall buildings have endeavored to solve the problem in several ways, of which none has been completely satisfactory. The superposition of orders, as in the case of the St. Paul Building and the American Telephone & Telegraph Building, is completely unsatisfactory, even when the orders themselves are as beautifully proportioned as those of the latter building. A more common attempt at solution has been to endeavor to include within a single order several stories of windows, with large masonry openings, the floors and partitions between rooms being cared for by metal mullions and transoms within the masonry openings. The most successful of all buildings of this type is probably McKim, Mead & White's alteration to the old New York Customs House, but even this building, although not very tall, cannot be said to be completely satisfactory. The most common treatment of our later buildings has been to indicate the classic character of the building by orders applied at the base and less often at the crown with a plain shaft pierced with undecorated

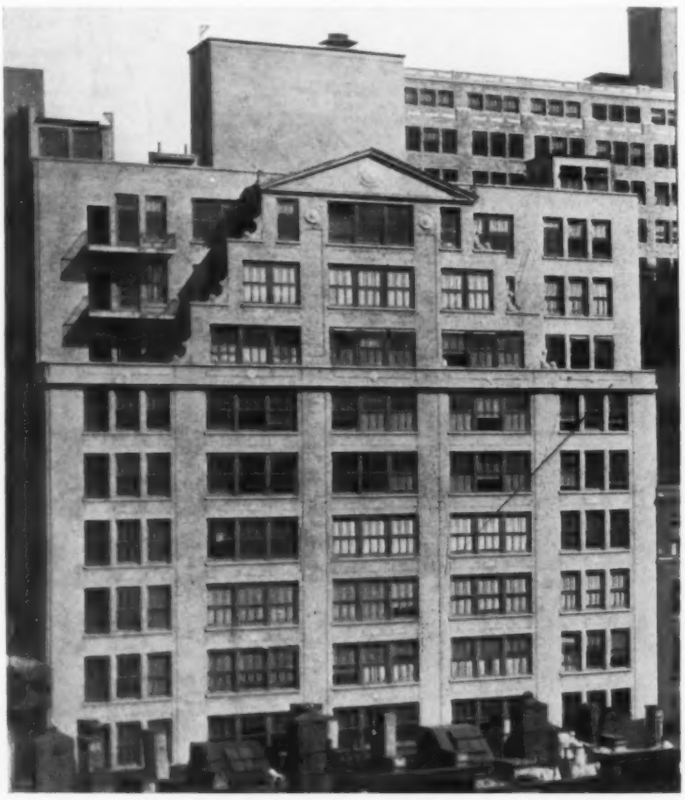
Fisk Building from 58th Street

Upper Stories of Younison Building, West 35th Street, New York
Geo. & Edw. Blum, Architects

windows. This is in a way begging the question, because the order is used purely as an ornamental appendage, although its use as an ornamental motive is perfectly defensible. When this use of the order was comparatively new, it was objected to on the grounds that the steel framework of the structure was insufficiently expressed. Now that we have been accustomed to this, and from seeing examples of steel construction in constant progress before our eyes we have learned what the skeletons of our tall buildings are, we have become used to the conventional form of covering these structures and it no longer seems unreasonable.

Now whether the conventional facade is really the best that could have been obtained is no longer of such great importance, since we are again compelled to design in three dimensions; but I am by no means sure that the few buildings which have been built under the new zoning law are steps in the right direction toward a proper solution of the problem, although certain features are unquestionably right. These new buildings seem for the most part to be adaptations from the facade designs of tall buildings. In other words, the upper order has been wrapped around the four sides of the structure, not supporting the cornice on the street facade, but stepped back on a sort of platform; and we are having a series of buildings set one upon another, rather than single buildings decreasing in size as they mount. Whether this solution is the only one practicable because of the expense of any other form of design, I am not prepared to say, although it seems very likely; but so far none of our tall buildings exhibits quite the continuous growth from base to summit that an architect would like to see. The nearest, perhaps, to this ideal is the Cunard Building,* but I am informed that the zoning law had little effect upon its design. Of the other new buildings, the Heckscher Building most nearly approximates the ideal—at least there is unity of design apparent from the base to the summit; the scale appears from the street level to be unchanged throughout its height, and the silhouette is excellent. The problem was however much less difficult than in the case of either the Fisk or the Liggett Building, and the necessity for the extreme of commercial economy of space was not apparently necessary.

One of the happy by-products of current design is the elimination of wide overhanging cornices; a reminiscence of the time when every building was supposed to be crowned by a cornice which bore a very direct relation to the height of the facade. With the increase in height of our office buildings the size of the cornice was increased so tremendously that its cost overbalanced its questionable artistic value. I think we can safely say that the wide projecting cornice has been done away with for good and I, for one, am glad to see it go. Its usefulness had been long outlived.



Upper Stories of Aronson Building, West 36th Street, New York
Schwartz & Gross, Architects

Another difficulty in the design of our tall buildings is the overwhelming amount of glass required for show windows on the lower stories, and these have been in no way affected by the zoning law. Its principal benefits have been the standardization of the heights of buildings, thus eliminating the bare, unfinished sides which have so long been eyesores in New York and have made our buildings look like stage scenery, and the enhancement of the silhouette above the cornice line. The experiments thus far made, great as they are in expense, have been comparatively few in number; but the skill of our architects has so increased in the past 20 years that these more or less tentative efforts have a certainty and a rightness of design that earlier architectural experiments in new fields were not able to show.

The accompanying illustrations have been selected to give a representative idea of the work thus far completed under the zoning law restrictions. They are restricted to office and loft buildings, of necessity since construction of other types of building has been very limited; they illustrate a variety of methods of design, however, and provide a good basis for work in the future.

*THE FORUM, July, 1921.

Making the New York Zoning Ordinance Better

A PROGRAM OF IMPROVEMENT*

By HERBERT S. SWAN
Executive Secretary, Zoning Committee, New York

THE 25th of July this year marked the fifth anniversary of the beginning of zoning in New York. Five years is not such a very long time, yet it is sufficiently long to permit the merits and demerits of a legislative measure to evidence themselves. An appraisal of the actual effects of the law, at this time, may prove of value not only in strengthening and improving its provisions but in cautioning other communities, which have not yet adopted zoning, what to avoid if they are to derive the maximum benefit from the operation of a zoning ordinance. The object of this paper will be, therefore, to point out steps which will tend to facilitate the administration of the law, to simplify its provisions so that they may be more readily understood by the architects, builders, real estate men and owners who must daily apply its regulations to concrete cases, and to suggest measures for remedying some of the defects and weaknesses which experience has shown the law to possess.

The numerous benefits conferred by the law will not be recounted here. Although our discussion will frankly be a critical inquiry into the shortcomings of the law, we do not wish our position misunderstood, for zoning has proved and is proving of incalculable benefit to the city. That it has positively demonstrated its worth in stabilizing and enhancing property values, and that it is directing the growth of the city along constructive and intelligent lines are matters of such common knowledge that it is superfluous to dwell upon them. Everybody agrees that zoning has justified itself in practice—even the skeptics, who doubted the expediency of adopting it.

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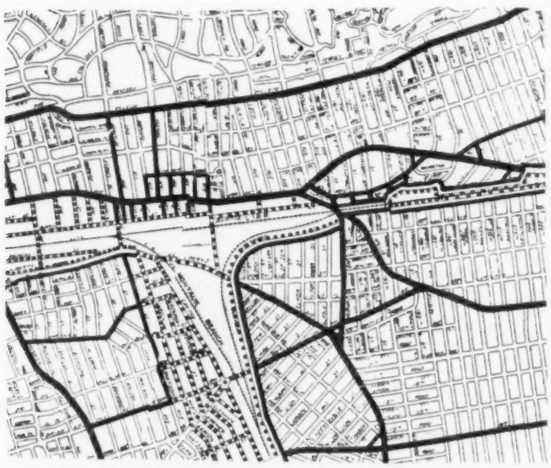
* The opinions expressed in this paper are the writer's own personal views

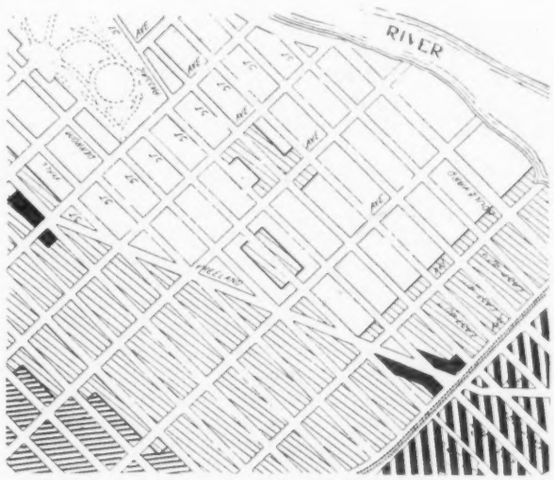
THE COMPLEXITY OF THE ORDINANCE. A criticism repeatedly lodged against the zoning ordinance is that, viewed simply as a piece of bill drafting, completely ignoring the wisdom or unwisdom of its substance, the ordinance is so involved and complicated in its form and method of statement as to render its meaning obscure and sometimes unintelligible. This comment may probably not be altogether unwarranted for it is not an infrequent occurrence to find people who differ fundamentally in their interpretation of the ordinance, and upon occasions to find some persons interpreting the ordinance in radically different ways at different times.

It is quite true that this uncertainty in interpreting the law has resulted in untold enbarrassment to both administrative officials and the public. Officials have wished to enforce the law, but not being clear as to its provisions, have hesitated and done nothing; owners have wished to obey the law but, failing to understand it, have ignored it. It is not true that the zoning law is not enforced in New York; the zoning law, being what it is, is probably enforced as well as can reasonably be expected—the point is that, were the law more definite and precise, it could be administered far more effectively, easily and satisfactorily than is done at present.

Take the rules governing the application of the map designations as an illustration. The different zones in New York are not laid out and bounded upon a map; instead, different symbols are used to designate the streets, each street or part of a



Part of the Borough of Queens Use Map. There are three zoning maps in New York, the height, use and area maps, each independent of the other, with overlapping zones and different map designations.



Part of the Paterson, N. J., Zone Map. The height, use, area, building line and family per acre limitations are all combined in one set of regulations. Zones are shown within block lines instead of street lines as in New York.

A Suggestion for Simplifying the New York Zoning Map

street constituting a zone or part of a zone, according to the sphere of influence exercised by the symbol or symbols used in the adjacent street. The complexity of these rules may be suggested by mentioning the fact that in the zoning commission's report, the ordinance itself, containing all the regulations, occupies but 13 pages while the 26 rules relating to the map designations and the 38 illustrations demonstrating their application, occupy 10 pages. Without these rules and the illustrations accompanying them, nobody could possibly define the areas situated in different zones, and even with them, some people experience the greatest difficulty.

The simplicity and directness of method used in constructing a zoning map proves of inestimable help in enforcing an ordinance. The method used to designate the different zones should certainly be simplified at the first opportunity. Symbols in the streets with spheres of influence should be entirely abandoned and in their place designations applying to the land itself substituted. When so much of each block as may be within a different zone is shaded or cross-hatched in a different manner, every property owner will know exactly how his property is zoned. In Newark, for instance, rules defining the extent of the different zones occupy exactly eight lines of type. Their brevity and clarity not only enable everybody to understand and remember them, but to determine instantly in what zone any parcel is located.

The New York ordinance contains three separate and distinct sets of maps,—one for each of three sets of zones, one for the use regulations, and one for the area regulations. When it is recalled that each of these maps outlines from three to five different kinds of zones, not co-terminous with one another, the complexity of the regulations becomes apparent. Theoretically susceptible of 75 separate and distinct combinations, the regulations are actually applied to the ground in such a manner as to form 36 kinds or classes of zones.

The Advantage of a Single Zoning Map. If the height, use and area provisions could be combined into a single set of regulations and the zones shown upon a single map as has been done in some of the more recent ordinances, as in Montclair, for instance, the administration of the law would be very appreciably simplified. Instead of having to examine three different maps to ascertain how the zoning regulations affect his plot, the property owner would have to examine but one.

Desirability of Establishing a Fourth Use Zone. The ordinance establishes three classes of use zones. The residence zones exclude all kinds of business and industry; the business zones all kinds of large manufacturing establishments occupying buildings more than one story high, and nuisances. Nuisances, unfortunately, are not excluded from the industrial zones. The effect of this provision is to afford insufficient protection to manufacturing. If a factory requires more than 25 per cent of the floor area in a building, or a floor area in excess of the lot area, whichever is the greater, it is forced into the unrestricted zones containing all kinds of nuisances.

To put manufacturing establishments and nuisance uses into the same classification has produced many unhappy compromises, as every unrestricted zone was the result, more or less, of a balance struck, on the one hand, between the just claims of the district for factory development and, on the other hand, the protection demanded by neighboring residence and business zones against nuisances. In some instances, nuisances were allowed where they would do great harm for no better reason than that the locality was naturally a manufacturing district; in other cases, factories were prohibited on the ground not that *their* admission was undesirable, but because the nuisances that might slip into the district with them would prove a serious menace to adjoining business or residence zones. Four classes of zones — residence, business, manufacturing and nuisance — should be established at the first opportunity to correct this defect in the ordinance.

Factories in Business Zones. At the same time that a fourth zone is established to protect light from heavy industry, it would seem desirable to modify the rule governing manufacturing in the business zone. At the present time, a one-story factory may locate anywhere it chooses in the business zone. The admission of such factories to business zones deprives business of much needed protection. It also acts as a standing threat to the security of such residence zones as may adjoin the business zones.

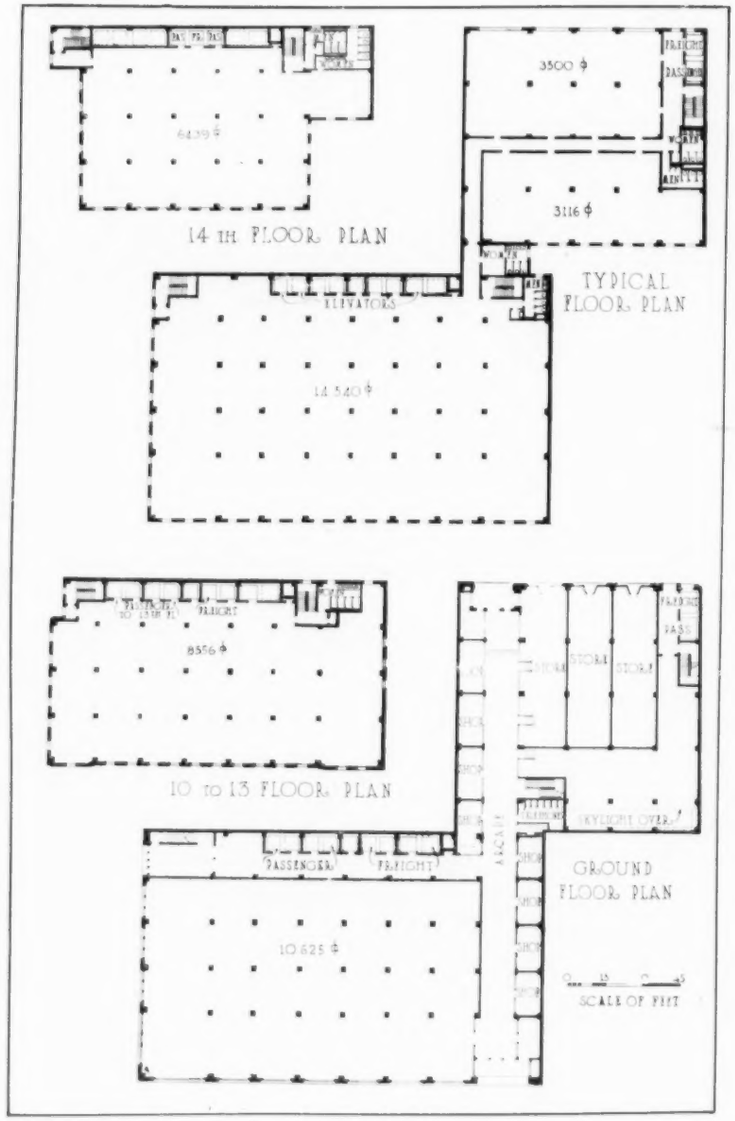
The provision permitting 25 per cent of the floor area in a building to be used for manufacturing, where such an area exceeds the lot area, was included in the ordinance to permit such manufacturing in business zones as may prove necessary as an incident to the conduct of a retail business. As a general proposition this proportion of the floor area has proved ample for the manufacturing needs of retailers, though there are cases on record where it has worked distinct hardship to businesses admittedly desirable in business zones. The fault to be found with the provision is not so much on the ground that it unnecessarily cramps milliners, modistes, custom tailors, etc. in the space they may occupy for their workrooms, as that it permits out-and-out manufacturing in business zones, whether or not it is an incident to a retail business. Then, too, the provision is all but impossible to enforce. A reasonable rule to follow would seem to be one which permitted as much or as little space to be used for manufacturing purposes as might prove essential to the conduct of the retail business to which the manufacturing should be an incident.

The "E" Area Zones. Much has been written and said about the "E" area zones. Some people frequently refer to them as the "30 per cent zones," although this is a misnomer, for instead of being

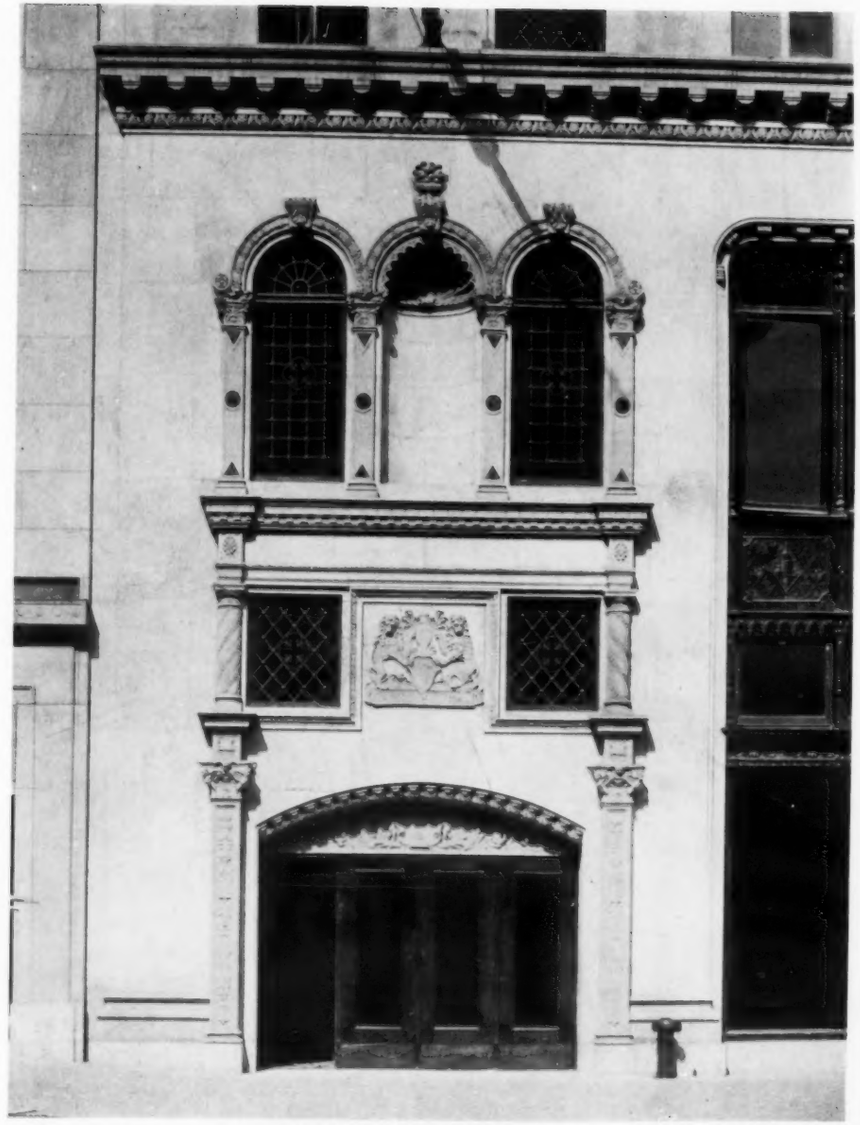
57TH STREET FACADE FROM UPPER FIFTH AVENUE

HECKSCHER BUILDING, NEW YORK

WARREN & WETMORE, ARCHITECTS



PRINCIPAL FLOOR PLANS



FIFTH AVENUE ENTRANCE DETAIL

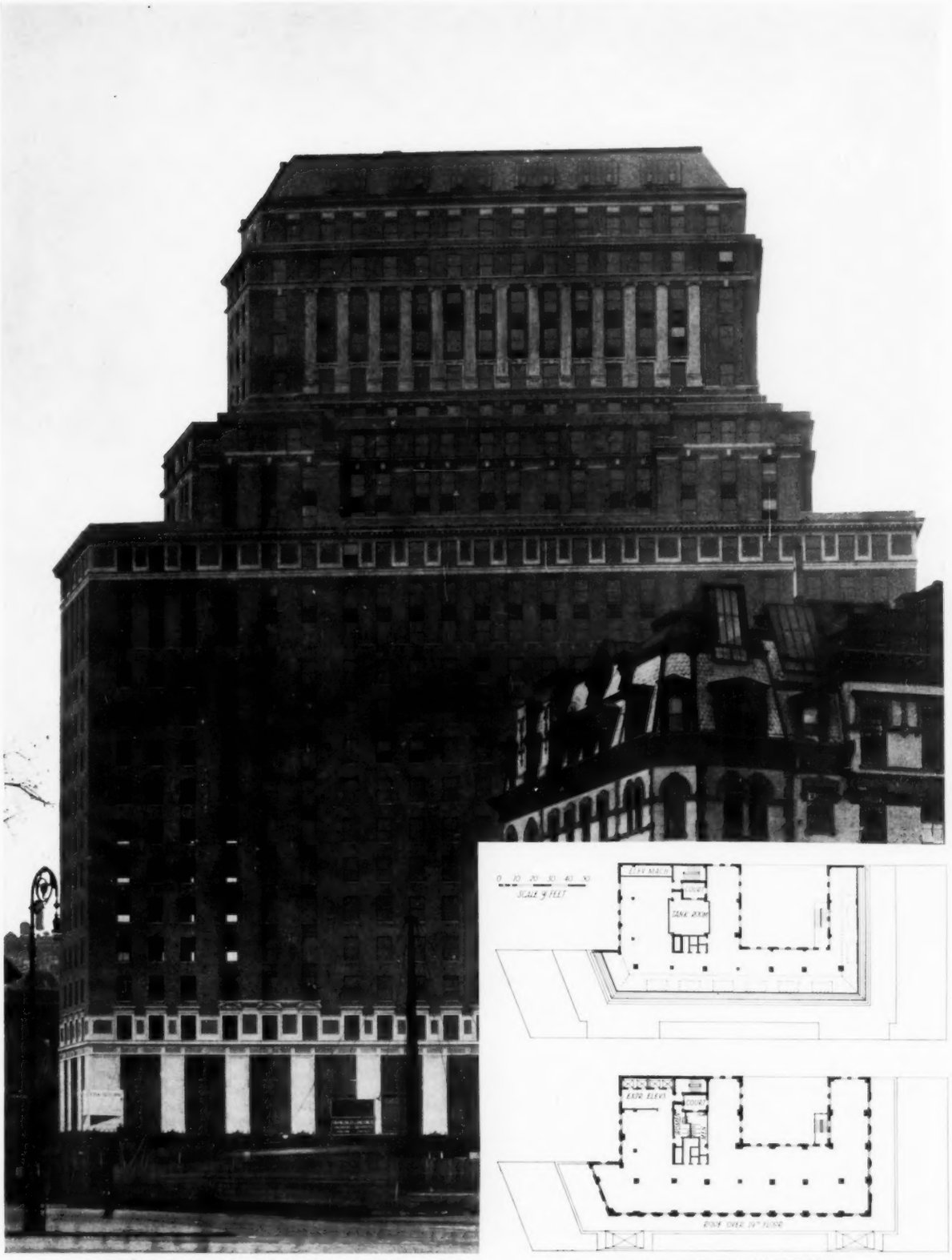
HECKSCHER BUILDING, NEW YORK

WARREN & WETMORE, ARCHITECTS

DETAIL OF TOWER AND TOWER PLANS

HECKSCHER BUILDING, NEW YORK

WARREN & WETMORE, ARCHITECTS



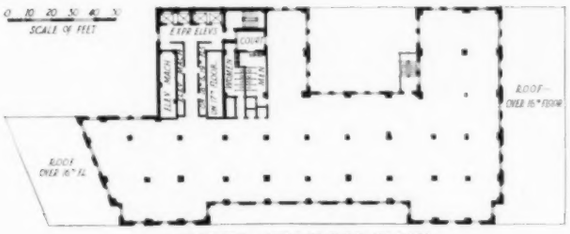
58TH STREET FACADE FROM COLUMBUS CIRCLE

PLANS OF TWO TOP FLOORS

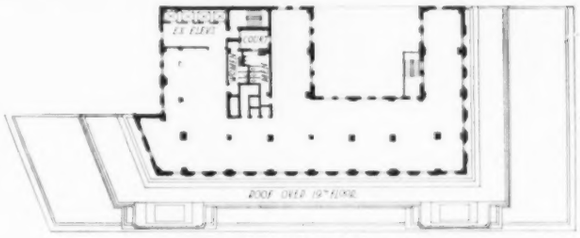
FISK BUILDING, NEW YORK

CARRERE & HASTINGS, ARCHITECTS; SHREVE, LAMB & BLAKE, ASSOCIATED

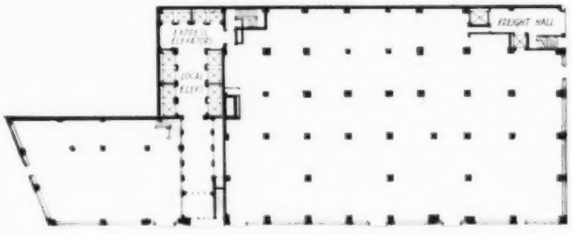
DETAIL OF LOWER STORIES



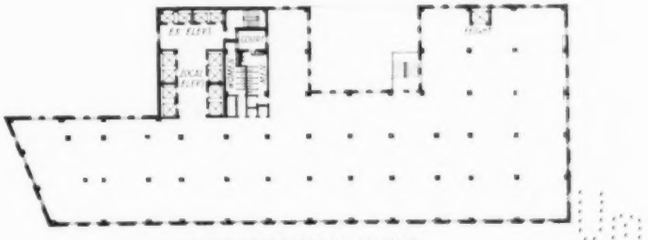
17TH TO 19TH FLOOR PLANS



20TH TO 24TH FLOOR PLANS



FIRST FLOOR PLAN



3D TO 16TH FLOOR PLANS

FISK BUILDING, NEW YORK

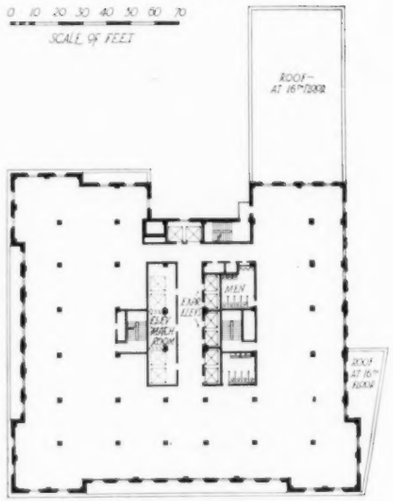
CARRERE & HASTINGS, ARCHITECTS; SHREVE, LAMB & BLAKE, ASSOCIATED

MADISON AVENUE AND 42D STREET FACADES

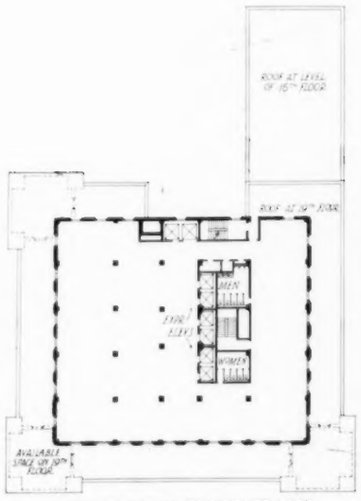
VIEW FROM PARK AVENUE VIADUCT

LIGGETT BUILDING, NEW YORK

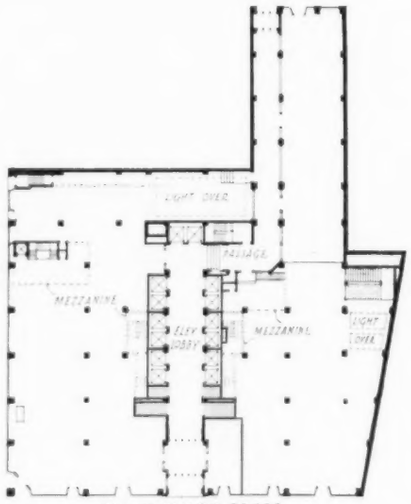
CARRERE & HASTINGS, ARCHITECTS; SHREVE, LAMB & BLAKE, ASSOCIATED



17TH FLOOR PLAN



19TH TO 23D FLOOR PLANS



FIRST FLOOR PLAN

3D TO 12TH FLOOR PLANS

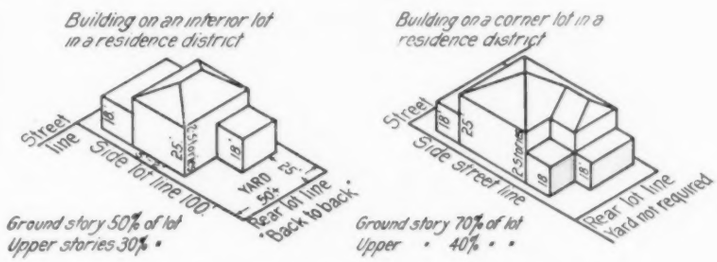
DETAIL OF UPPER STORIES

LIGGETT BUILDING, NEW YORK

CARRERE & HASTINGS, ARCHITECTS; SHREVE, LAMB & BLAKE, ASSOCIATED

limited to 30 per cent of the ground area, buildings may, in the case of interior lots, cover 50 per cent of the ground and in the case of corner lots, 70 per cent of the ground. At a height of 18 feet above the curb, these percentages are respectively reduced to 30 and 40 per cent of the ground.

It was hoped that the large amount of open space required around buildings in the "E" zones would exclude apartments. In the main, this hope has been realized since but one apartment has been built since the adoption of the ordinance in an "E" zone. The fact that one apartment has been built is, however, portentous for the future. Certainly it would seem wise to devise more effective means of excluding the apartment from private house zones than a zoning restriction which affords the possibility of erecting buildings covering 30 per cent of the lot up to a height of once the street width, and covering 25 per cent of the lot to any height above once the street width as the builders might choose. There is no means of knowing when a private house area, even though situated in an "E" zone, may be transformed into a district of towering apartments.



Typical Examples of Building in Area "E" Districts (Residential) in New York

Different means may be resorted to in guaranteeing a more assured and stable future to private homes. A lower height limit, if a flat one, would in itself go a long way in this direction. The highest class residence suburbs in the vicinity of New York, such as Glen Ridge and White Plains, for example, prevent buildings in their best zones from having a greater height than 35 feet. This excludes buildings more than 2½ stories high. In addition to this, these suburbs limit the number of families to the acre, eight, nine or ten families to the acre being a very common restriction in the most highly protected zones. This provision, of course, makes the large apartment impossible. Surely private houses should be afforded as much protection within the city as neighboring suburbs under the same conditions accord them. In this matter, then, it may prove advisable to review not only the percentage of the ground area which a building may occupy, but also the provision requiring but one side yard. Many communities in the vicinity of New York, having a development no better than that found in various sections of the several boroughs, demand two side yards and limit buildings at the ground to 25 or 30 per cent of the lot areas.

Building Lines. A subject that should also receive immediate attention in these districts is that of establishing building lines. At the present time, buildings may be built out to the sidewalks even in the most protected zones. New York may well profit by the example set by Paterson, where no building in the residence districts may project beyond the average setback line at present observed by the buildings on the same side of the street within the block. Where there are buildings now on only one side of the street within the block, then the setback line on the vacant side must be the same as the average setback line on the improved side. Where there are no buildings on either side of the street, a uniform setback line suited to the requirements of the type of building anticipated in the district is established on both sides of the street.

Families per Acre. The great outstanding bane of New York life is the congestion of population. Bad as it is, one would scarcely believe that it could become worse, and yet this is the appalling fact. A density that was deemed "bad" a few decades ago is thought "good" today; what was intolerable then is now rapidly becoming the average. The worst conditions affecting land overcrowding in 1921 would have been thought beyond belief a generation ago and still the process keeps right on, scores being jammed into the same space formerly occupied by tens, the houses built bigger and taller, the rooms both narrower and shorter, and the apartments containing fewer and fewer rooms. This evil the zoning ordinance leaves untouched. Tenements may be built substantially the same as before the enactment of the law.

Other cities, commencing with Newark in 1919, have decided that such congestion should not be allowed within their borders and that there is a limit to the number of families that can live on a unit of ground beyond which they cannot be housed decently, and that this limit shall not be transgressed. If the number of families to the acre is limited *now*, large areas in the Bronx, the greater portion of Brooklyn, practically the whole of Queens and all of Richmond can still be saved to civilized standards of living. Let the opportunity of doing something pass now and it will only be a question of time, provided the population of the city continues to increase, until east side conditions will extend to every part of the greater city.

Dwellings in Industrial Zones. The "A" area zones in New York are practically unrestricted zones. No open spaces of any description are demanded—buildings may occupy the entire lots. In these zones the only requirement governing the erection of buildings is that any court or yard pro-

vided as the sole means of lighting or ventilating rooms shall not be less than one inch in width for each foot of building height.

The "A" zones embrace, as a rule, all the localities set aside for industrial purposes. Now, it is perfectly proper not to exact as much open space from industrial structures as from residential buildings, but the regulations governing the "A" zones affect the two classes of buildings in identically the same manner. In other words, the "A" zones have unwittingly been made asylums for all classes of residential buildings which may feel themselves unduly oppressed by the area requirements exacted in the B, C, D and E zones. Residential buildings should positively not be allowed in industrial zones unless they conform to as high standards in the way of courts and yards and other open spaces as are required in the least restricted residence zone. To demand lower standards for dwellings in the industrial zones than in the residence zones can in the long run only result in creating the very kind of a situation zoning is designed to remedy.

Rear Yards. The New York ordinance requires rear yards only in the cases of such interior lots as are back to back with other interior lots. Interior lots backing upon corner lots need not provide rear yards, nor interior lots the rears of which happen to be within 55 feet of any street. Corner lots, no matter how large or how situated, as well as through lots, are also exempt from the rear yard requirement. With the exemptions the law allows, it is possible to build up entire blocks without providing a single rear yard. In many instances where the law does demand a rear yard, the requirement may be such an isolated instance as not to serve any real purpose.

In residence sections it would seem eminently fair to exact a rear yard in the case of every lot, other than a through lot having a certain depth, whether the lot is an interior lot or a corner lot, a lot back to back with another lot or a lot back to side with an adjoining lot. In business and industrial districts, situated as these are in New York, the provision requiring a rear yard could very well be eliminated entirely. To insist on a rear yard in the case of every interior lot would seriously hamper the erection of efficient business buildings. With blocks only 200 feet wide it is, of course, absolutely necessary to permit buildings to run through the block from street to street as it would be impracticable to limit the depth of large stores, theaters and office buildings to 100 feet. When this concession is made to through buildings, there is little object in requiring all buildings that do not run through the block to be equipped with rear yards. Rear yards, provided on isolated lots scattered here and there through the block between through buildings or corner buildings, do not help the ventilation in the block any more than inner courts.

A deep building, however, with three dead walls, obtaining all its light and air from but one side, is a bad structure. Daylight and ventilation, other than that coming through the front windows, must be provided to obtain a satisfactory building. But this result can be accomplished by limiting the maximum per cent of lot area that the building may occupy and leaving the choice of the open space used, whether it be an inner court, an outer court, a side yard or a rear yard, to the builder.

Operation of the Height Regulations. It is quite natural that the provision in the New York ordinance to attract the most widespread popular attention should be that regulating the height of buildings. As the time since the adoption of the ordinance lengthens, and the number of skyscrapers erected under the law multiplies, the more conspicuous is the effect of this provision. Each new high building, because its facade must be set back in steps, terraces or mansards with each unit of increased height, tends only to enhance the public's interest in the height regulations of the ordinance.

Though the effect of the height

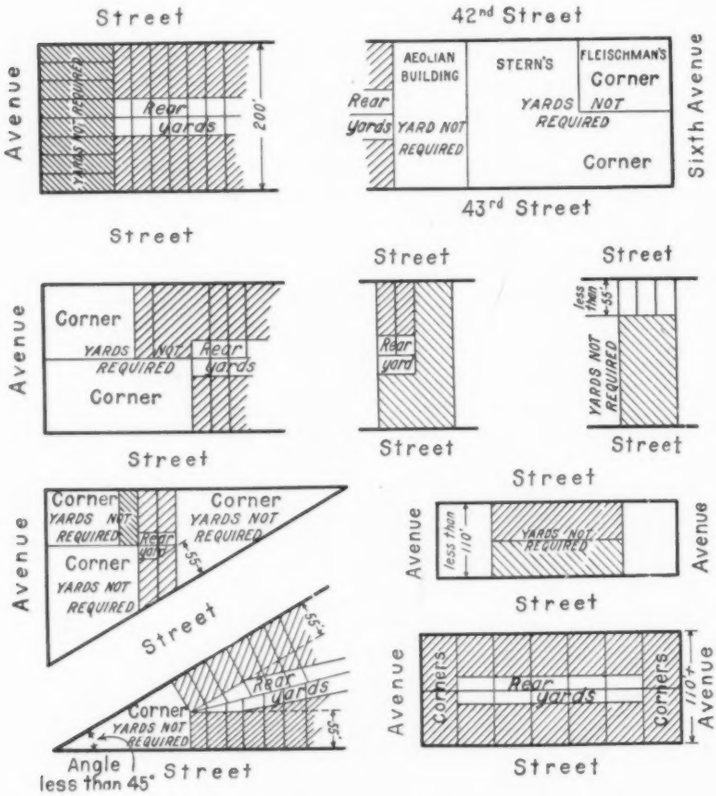


Diagram Showing Rear Yard Requirements under Various Site Conditions (New York Law)

regulations may be the most outstanding result of the New York ordinance to the casual eye, especially to the occasional visitor who seldom gets out of the Times square district, this is in reality far from the truth. The height regulations benefit but part of a single borough; the use regulations benefit all the boroughs. Below 59th street, in Manhattan, the height regulations are certainly leaving their stamp upon the city's architecture; the front of nearly every new building erected in this section of the city recedes from the street line at a height varying between 120 and 250 feet above the curb. Outside of the section below 59th street in Manhattan, the effect of the height regulations, however, is not nearly so conspicuous; in fact, it is a rare building that is affected by them at all, for the reason that the height of buildings allowed up to the setback plane is higher than the average person cares to build.

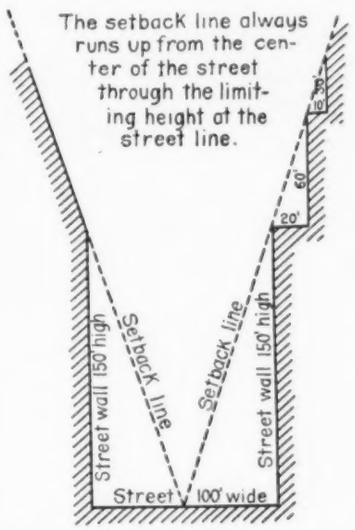

The setback line always runs up from the center of the street through the limiting height at the street line.
10'
60'
20'
Street wall 150' high
Setback Line
Setback Line
Street wall 150' high
Street 100' wide

Diagram for Determining Angle of Setback
Typical Example in 1½ Times District

The height regulations in New York cannot be described accurately as height limits for they do not limit the height of buildings; they merely regulate the manner of erecting high buildings. In no part of the city is an absolute height limit imposed upon buildings—a limit beyond which no building may be erected higher. On the contrary, buildings of unlimited height are permitted in all parts of the city. The basis for the regulations in the different zones is a multiple of the street widths. In the least restricted section, buildings may be built at the street line to a height 2½ times the width of the widest abutting street. Beyond that point, they are permitted to go up to any height their owners choose, so long as their facades are set back at the rate of one foot horizontally for every five feet of building height. The multiple of the street width used in the different zones varies, there being five height zones. The multiple in the highest is 2½ times the street width; that of the lowest, once the street width. The multiples used in the intermediate zones are twice, 1½, and 1¼ times the street widths. The setback ratio above the limiting height plane at the street facade is twice that of the street multiple, being 5 to 1 in the 2½ times zone, 4 to 1 in the 2 times zone, 3 to 1 in the 1½ times zone, 2½ to 1 in the 1¼ times zone, and 2 to 1 in the 1 time zone. For the purpose of the regulations, no street is deemed less than 50 feet wide nor more than 100 feet wide.

Excepting in the older parts of the city, few streets are less than 60 feet wide. The major streets, of course, greatly exceed 60 feet in width, many of them being 100 or even more feet in width. Towers of an unlimited height are allowed in all zones. The ruling provision governing their erection is that they shall not occupy more than 25 per cent of the lot area and that they shall not be nearer than 75 feet to the center of any street.

THE SETBACKS. A setback obviously admits more light and air to the lower stories than a vertical wall. In New York, however, the setback ratio is not the same as the street multiple. In the highest height zone, for example, each foot of street width below the setback plane will admit of 2½ feet of building height. Above the setback plane, however, each foot of open space will permit 5 feet of building height. In this respect, the setbacks tend to put a premium upon the construction of high buildings. When the center of the street is considered, the setback plane does preserve a uniform angle of light; but when the lower stories on the opposite side of the street are considered, which is the consideration of real importance, each increase in height diminishes the angle of light. Viewed thus, the setbacks, of course, stultify themselves. To achieve their object, the setbacks should clearly be proportioned in the same ratio to the open spaces in front of them as the height below the setback plane is to the street width.

The buildings erected under the ordinance are as high in the downtown section of Manhattan as the buildings erected there before the ordinance was passed. The height regulations imposed by the zoning ordinance have not sounded the death knell of skyscraper construction. There is, however, a distinction between the old skyscrapers and those erected under the law, for the newer buildings in receding from the street admit more light and air to the lower stories than the old structures. In that respect, the ordinance is undoubtedly an advance over what we had during the days of unregulated building.

FLAT HEIGHT LIMITS *vs.* MULTIPLES OF THE STREET WIDTHS. But an increasing number of people feel that the height regulations are all too lenient, and that if the entire city is to be built up with structures of the maximum height allowed by the ordinance, the result, so far as it prevents street and sidewalk congestion and the ability of rapid transit lines to care for rush hour crowds, to say nothing of land-overcrowding and home environment, will not be what it should be, and that a general tightening up of the height provisions is therefore desirable. No one believes that a series of flat height limits would be superior to using setbacks and different multiples of the street widths.

A height limit based exclusively upon a multiple of the street width, it is true, has certain objectionable features which cannot be lodged against a flat height limit. Probably the chief among these is that it does not promote a uniform type of development throughout a district. Being based upon the street width, it allows higher buildings upon the wider streets and thus actually invites the location of buildings that will not comport with the general character of the neighborhood. High apartments in a private house zone, for instance, are only a little less objectionable than stores. The fact that they happen to be located on a wide street hardly mitigates the injury, as the blight suffered by the adjoining houses is identically the same, no matter how wide or narrow the street is on which the apartments front.

Basing the height regulations upon a multiple of the street width does not, of course, obviate the necessity of establishing general classes of height zones, each governed by its own multiple of the street width. The height limit, in a particular case, therefore, will vary not only according to the width of the street but according to the zone in which the building is located. In applying the multiples of the five New York height zones to only six sets of different street widths, 50-,60-,70-,80-, 90-,and 100-foot streets, one obtains no less than 22 separate and distinct height limits. There is often a greater difference between the height limits established for the widest and narrowest streets within a given zone than there is between the narrowest and widest streets in two different zones. Indeed, there are many instances in which higher buildings are allowed on the wider streets in a zone apparently subjected to a stringent restriction than on narrower streets in a zone with a more liberal multiple.

THE PROGRAM OF IMPROVEMENT. To summarize: A program for improving the New York zoning ordinance should provide, among other things, for:

1. The appointment by the Board of Estimate of an advisory commission of citizens to review and examine the whole zoning ordinance with the object of correcting such mistakes as experience may have demonstrated were originally committed in preparing the plan, whether such errors are contained in the detailed provisions of the ordinance or in the boundary lines of the several zones established by the zoning maps. Only by the appointment of an official commission, whose sole function it shall be to study the zoning ordinance, can we expect to obtain a serious consideration of the subject in a comprehensive and an intelligent manner.

2. The extent of the different zones should be indicated not by symbols within the street lines of the map but upon the ground itself.

3. If possible, the three different sets of height, use and area zones should be combined into a single set of zones and shown upon a single map.

4. The different kinds of zones should be reduced to the smallest number consistent with the protection required by the types of development.

5. A fourth use zone should be established for nuisances and heavy industries.

6. The provision permitting one-story buildings in their entirety and 25 per cent of the floor area in higher buildings to be used for manufacturing purposes in business zones, should be modified so that as much or as little of the floor area may be used for manufacturing purposes as the retail business, to the conduct of which the manufacturing is an incident, might require. Manufacturing not conducted as an incident to a retail business should be entirely excluded from business zones.

7. The "E" zones should be tightened up so as positively to exclude the construction of multi-family houses.

8. The number of families to the acre should be limited.

9. Building lines should be established in residence zones.

10. Residence buildings erected in the industrial zones should be required to comply with at least as high area standards as those established for the least restricted residence zone.

11. In residence zones, the provision of a rear yard should, generally speaking, be made mandatory upon every lot. In the business and factory zones, the provision of a rear yard should be left optional with the builder, the interests of light and ventilation being sufficiently secured by a limitation upon the percentage of lots buildings may occupy.

12. The height provisions of the ordinance should be revised and flat height limits substituted for multiples of the street widths.

13. Multiples of the street widths, if used to limit the height of buildings at all, should be used only as auxiliaries to flat height limits and in a manner to restrict buildings to a lower height on the narrower streets within a zone, than would be obtained by the flat height limits.

14. Whether or not flat height limits are substituted for multiples of the street widths, the height zones should be thoroughly reviewed throughout the city, especially outside of Manhattan, and lower height limits imposed.

15. Towers occupying 25 per cent of the lot areas should not be allowed throughout the city. In private house districts, this privilege may be exercised in a manner to secure apartment houses of unlimited height.

16. The setback ratio should be reduced so that the height above the commencement of the setback plane shall bear the same relation to the space in front of the building as it does below that point.

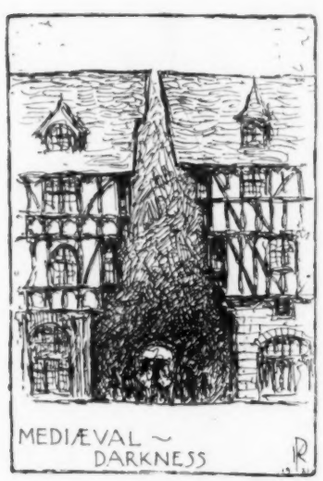
The New York zoning ordinance, being the first comprehensive, city-wide zoning ordinance adopted in the United States, cannot, of course, be considered the last word upon the subject. Like all initial things, it left much to be desired. We learn only through trial and error. Having had five years' experience, it is only natural that New York should know how to draft a better law today.

Zoning and the Architecture of High Buildings

By IRVING K. POND

ZONING of towns and cities has its roots and ramifications far back in the past; yet, as practiced today, it may be regarded as a more or less modern institution. Its relation to architecture is intimate—not, perhaps, fully perceived at first glance but becoming apparent with study and observation. The individual dwelling—the house,—and the communal dwelling—the apartment house —were well developed in essentials of plan and design before the necessity of zoning, apart from its bearing upon town planning, was recognized; in fact, it was the desirability, not to say necessity, of preserving the spiritual character of the house and the apartment house and of conserving their material values that called modern zoning into existence. The encroachment of business and trade and industry upon the home, to the spiritual and physical detriment of the latter, was the primary reason for zoning. Now zoning protects the individual house from the overpowering apartment; the home and the apartment from business; business and trade from objectionable forms of business and trade, and from industries.

The simplest form of zoning exists in the well planned dwelling house. The elements include the basement with its heating plant, fuel bins, laundry and storerooms; the main floor with reception hall, living room, dining room, serving pantry, kitchen, store closets, maids' dining room, etc., all arranged so as to function properly without interference or overlapping; the wider stairs (or boulevards) from community rooms to individual sleeping quarters on the second floor; the service stairs to the servants' living quarters which are convenient to the kitchen and labor zones. And then the apartment building, more complicated, with all the living and domestic requirements more or less upon one floor; with individuality expressed within each apartment; with serving quarters so arranged that the service of one apartment shall not interfere with the social or individual life of its own or of another apartment; with janitors, tradesmen, callers, dwellers, all accommodated after their own manner and necessity without interference or contact or conflict with others. This is the epitome, the beginning and almost the summing up of town planning and zoning.



But one house may be a menace to other houses, one apartment building to other apartment buildings, one industrial or mercantile building to others of its own class; and so zoning has to limit, in so far as possible, the interference of the individual or the group with the rights and well being of others and of the community. Zoning has to seek to accomplish through ordinance and regulation what really civilized and humane owners and builders and really conscientious, capable and well trained architects should and would have put into effect gladly and of their own initiative. Zoning, in some localities, has had to overcome or ameliorate conditions imposed by greed and avarice under the direction of stupidity and ignorance.

It seems rather astounding, does it not, that zoning commissions, forced into being by the dire exigencies of urban existence and conditions, commissions created by and composed in greater part, or quite wholly, of non-technical elements, should be called upon to direct architecture into proper channels of expression? And yet is it so astounding after all, and so out of accord with reason? Architecture worthy of the name has grown out of the life of the people—the non-technical people—and architects worthy of the name have given that life æsthetic expression and interpretation. So arose the great architectural styles of the past; so will arise any great architectural style of the future. I would not burden this paper with the slightest discussion of this generally accepted and really axiomatic proposition were it not that a new generation, well tutored in archæology and versed in academic formulæ, is entering the field, eager to apply a newly acquired knowledge which seemingly does not include a real appreciation or comprehension of certain vital truths; and, also, that so many practitioners of an older generation seemingly have forgotten the fact, if ever they had grasped it.

The architectural schools, to my seeming, are giving scant instruction in the art of life; giving little in addition to an uncanny facility in misapplying ancient formulæ to modern conditions. Schools and license and registration boards are not doing much to supply the public with interpreters of its life and its ideals in terms of art, which includes architecture. They, the schools and boards, are providing the public with a fairly efficient lot of designers of structures, but these are not necessarily architects under the real definition. Not every seed which falls upon fertile soil germinates into a beautiful flower or a succulent vegetable; weeds predominate and spread themselves naturally. The gardener works unceasingly to produce the flower which shall be his pride; that flower which, touching human accomplishment generally, is called art—as touching buildings, architecture. I have said this to indicate that architects among builders are rare—rare even among the generality of those who have assumed the honorable title of architect—and that is why zoning commissions and other agencies are needed now and again to point the way.

Architects have known of the old mediæval streets along which the houses overhung, jutting out story by story till the gables fairly touched, cutting out light and air, so that finally to save the street and teach architects their real duties the law intervened and let the life-giving light and air enter. The architects know and apply the classic-renaissance formula for projecting cornices and string courses; and they lined modern American streets with buildings of which the wide, overhanging projections grew bolder and bolder, so as to maintain "classic proportions," as buildings increased in scale and in height. Then the law intervened and said the cornice should not project more than so far over the street line. And the architect, that he might not be hampered in the application of the formula which produced his "classic proportions," set the building back from the street far enough to satisfy the law and his own perverted taste, and wasted another's property just to gratify his own personal whim. Architects, in school and out, must have learned or heard of mediæval and renaissance experiences and how the evil was rectified, and yet they seemed not to take the lesson to heart. The most flagrant types of mediæval exaggeration seemed not to have impressed them. They seemed not to remember that from gables almost touching across the streets came a reaction in the form of two-, three- or four-storied walls surmounted by pitched roofs with three, four, five, six or seven tiers of dormer windows, while in France, led by Paris, walls were limited to certain heights, and then came setbacks, vertical and sloping, with storied dormers. From these pitched roofs developed the bulging mansard, which should serve as a warning to modern American employers of the setback not to evolve a form so generally ugly and out of human scale.

All this history seems to have been forgotten by the architects of American cities till along came the zoning commission of Manhattan and brought designers to their semi-senses;—told them how to design for light and air, for wholesomeness and right living and told them almost how to design for beauty which up to that time had been a scant element in Manhattan's tall structures, whatever visitors from over seas may have said in their enthusiasm, to the contrary notwithstanding.

The idea of the setback building is old. A "staged tower" built about 2450 B.C. was incorporated in a Chaldean palace, the oldest known structure in Mesopotamia. The Assyrian palace of Sargon and the platform on which it stands employ the motif. The "Hanging Gardens" of Babylon furnished a fine example of "setback" construction (so did the "Tower of Babel," by the bye) and indicate a use which may be made of the level spaces caused by the setback walls of modern buildings. The clerestory of the Egyptian temple, but notably of the mediæval cathedral, is a striking example of setback construction designed to get light into the interior, but more especially to compel externally the effect of unity and of resistance to time and the elements, which emotions are induced by the pyramidal form.

The idea of the setback in high buildings, even in its present form, is not new. Toward the end of the last century the subject was treated by Louis Sullivan in relation to the tall office building. Contemporaneously I, myself, had studied the proposition in relation to tall apartment buildings as may be seen by reference to the third of a series of papers on "The Architecture of Apartment Buildings" published in this journal (then THE BRICK-

BUILDER), in the number for December, 1898. Ever since my earliest observations of architecture, and study of means to ends, and especially since my early dealing with the refractory material and causing it to express my desires and design, I have had a keen appreciation of the potency of the pyramidal motif to insure or strengthen the effect of unity in a composition, as in the Greek temples (notably the Parthenon) and to establish the feeling and effect of permanence and stability, as in the pyramids. Early in my practice I began to introduce this motif into my design by setting back the faces of walls where they fell off in thickness as a concomitant structural factor. Later I began to emphasize the feature and stress the motif in brick walls by cutting out a half brick in plan at the corners, forming a sort of bevel which increased by the elimination of more brick as the walls arose. The same feature was introduced into stone walls by channeling or fluting, simply below, then more and more richly as the coping is approached. The effect of this method of pyramiding, and hence of stabilizing and unifying, may be observed in the City Club building in Chicago, designed by my firm, and also in the Michigan Union building at Ann Arbor, in which setbacks and channeled corners are featured in brick and stone. No buttresses nor external piers are used or needed to enhance the structural effect of the pyramiding, the decreasing bulk of the masonry as the walls rise being sufficient.

The critical observer will note in both these buildings that setbacks and modified corners are used to enforce another element of the design, which is a direct appeal to sentiment and understanding on the part of the beholder. Horizontality and verticality are introduced into the structures in such manner that each may make its own appeal to the emotions and be held in restraint by the other only when it tends to step beyond the bounds of the larger unity which is determined upon in advance and which it is sought in every way to preserve. In the latter instance there was a study of college life and environment and a knowledge of the college constituency which gave the designer a clue to his larger masses and lesser details and permitted him through the medium of form and color to make an appeal which should find response in the mind and heart of the beholder, for both mind and heart were appealed to and not in vain.

Every work of art, every building into which the designer has put vital feeling, will produce a definite psychological reaction in a sensate beholder — and just about in the same ratio in which the designer has expended himself. It goes without saying that the designer and the beholder must have had community of background and experience that the reaction may be commensurate with the action; that there must have been on the part of both sender and recipient of the message some similar knowledge of the past, some appreciation of the reaction of the race to physical and spiritual environment, of reaction to atmospheric, geographic, climatic and geologic surroundings—to social, political and religious conditions. And this community of apprehension and appreciation should extend to and embrace modern categories and conditions, and include a community of idealism. The potentialities of feeling and expression within us have been implanted by the age-long contact of our ancestry with these conditions, physical and spiritual, and it is for us to release them in unstinted creative and appreciative effort.

What has this to do with setback walls and tower office building? It has this: that some beneficent power, embodied at present in a zoning law, has given architects a chance to create beautiful and appropriate buildings, not Greek temples nor mediæval cathedrals, but something modern, born of a new spirit which is neither Greek or Gothic nor Roman or classic renaissance, but which is intensely of today. There is a chance for the expression of poise, serenity and restraint controlling emotionalism and exuberance of spirit. All are factors of the modern age and all are to be considered and all, at times, in one composition. The tower office building under zoning laws would seem to furnish an opportunity for the latter.

I have discussed the elements of this problem in a book called "The Meaning of Architecture," written from years of experience with materials and men, years of physical and spiritual reaction to circumscribing conditions. I can do no better than to refer to its pages those who subscribe to its main thesis, which is that life is a struggle in which, by overcoming obstacles, character is to be developed in all the perfection of beauty, failing which man falls short of the ideal. Architecture, in the western world at least, is a symbol of this struggle, and a demonstration of perfect final achievement interpreted in terms of structural forces. The content of self-restraint, poise and serenity is to be manifested in the Greek expression of horizontality—not the details but the fact. The content of exuberance of spirit and emotionalism is to find expression in the mediæval concept of verticality—not the details but, again, the fact. We moderns have not the restrained philosophic attitude of mind toward life as had the Greeks, nor the exaggerated emotionalism of mediævalism in the presence of any civil, secular or religious manifestation, but we have in us elements of each which are to be reckoned with.

The problem of the architect in America today is to reconcile and combine these seemingly opposed but very human elements in a composition which shall be appropriate to the time, to the location, and to the conditions. I have suggested, merely suggested, in Figures 21, 22 and 24 in the book referred to, an application under dissimilar conditions and conceived in my mind before zoning commissions had created the issue; conceived because an ideal of appropriateness and beauty seemed to lead that way. A survey of recent buildings in Manhattan erected under the zoning law indicates that idealism as well as the law is pointing the way in some cases.

It were well, in studying the effect of zoning laws upon high buildings, to mark the wide distinction between a certain already existing type of building and that which is being evolved under the impulse of recent enactments. A zoning law, like that in effect in New York, requiring setbacks under certain conditions of environment, tends toward the development of the "tower building" as against the building with a "tower accompaniment" or a tower with a "building accompaniment" of which latter there are two or three striking examples on Manhattan Island, and an extremely crude suggestion of one of these New York structures in Seattle. In Chicago and elsewhere the type leans generally toward the building with the "tower accompaniment." Differing in primary impulse from that which led to the erection of the tower building,—a lofty, unified and quite self-contained composition,—these towers accompanied by buildings or buildings accompanied by towers were not called into existence by economic or social conditions, nor made to relate themselves to their environment by such or by other conditions affecting the well being of the community, but are altogether individualistic expressions, piercing the sky in order solely to attract attention to themselves. In this and other regards the attempt would have been equally successful and the æsthetic effect heightened had the building accompaniment been subdued or eliminated altogether. This could have been done in the case of any tower with "building accompaniment" with perfect feasibility and perhaps æsthetic gain; but an attempt to eliminate either factor, building or tower, in a "tower building" would be as fatal to the structure as to the idea. Tower and building are one, and the one factor is not to be distinguished from the other.

A building is often unified by the presence of the "tower accompaniment," just as a vocal performance is unified by an instrumental accompaniment. Our designers to date, especially those with classic or pseudo-classic proclivities, have been laboring under the delusion that u-n-i-t spells unity and have made their big buildings cubical affairs without charm or interest in general outline—seeking only size and lavish display of ornament to impress. Unity is a social element—a concomitant of civilization and culture, not easily achieved, no more so than civilization itself.

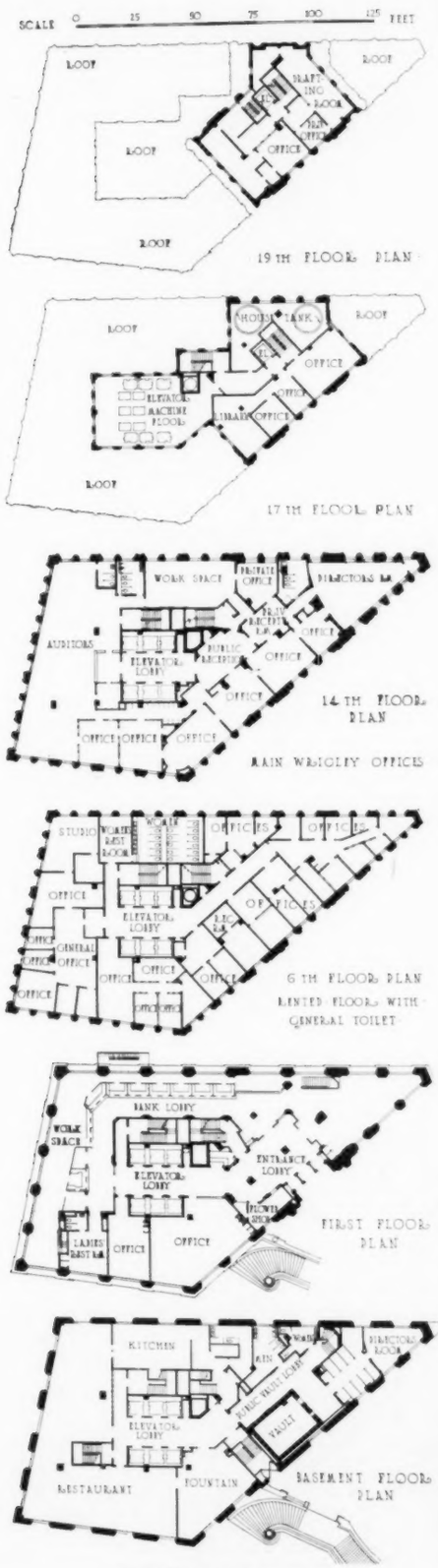
The effects of the units upon unity must be carefully considered in a "tower building." The setbacks may be treated so as to give the effect of a clustered village upon a high plateau, which is fatal to unity and to character. Designers of skyscrapers, in ante-zoning days, to get away from the stupidity and monotony of the cube and to introduce the pyramidal motif, were known to crown their 20- to 30-story office structures with domestic pitched roofs, thus eliminating every vestige of unity and character. The setback would have furnished them a needed relief, had they but known it. The upper stories of the setback building must be brought into harmony,—can only be brought into harmony, —with the whole by a rational and beautiful application of the principles of horizontality and verticality, not either or each alone, but both in harmonious interaction and co-ordination. The one will emphasize the element of repose, the other the element of action. It is for the architect to study the conditions surrounding him and his special problem and give to his structures the full and perfected character they deserve.

Aronson Building
Schwartz & Gross, Architects

Garment Center Buildings
Walter M. Mason, Architect

Younison Building
Geo. & Edw. Blum, Architects

A Group of New York Buildings Designed in Accordance with the Zoning Law



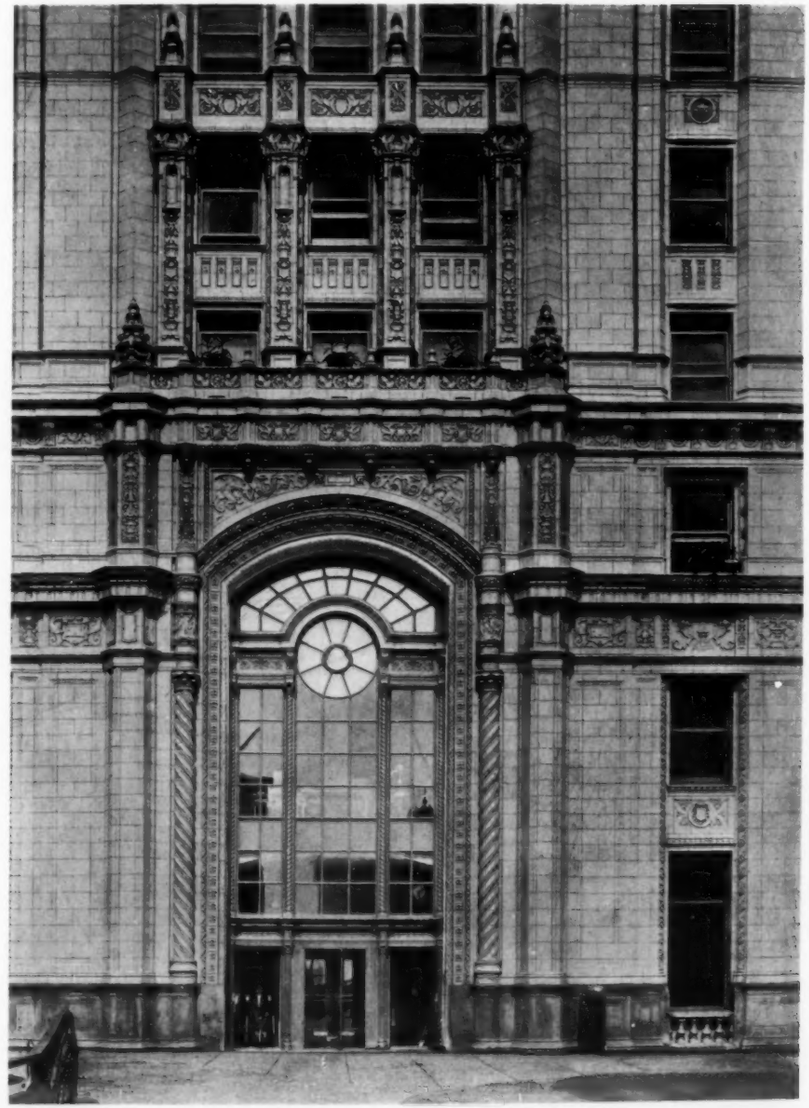
PRINCIPAL FLOOR PLANS

MICHIGAN AVENUE FACADE

WRIGLEY BUILDING, CHICAGO

GRAHAM, ANDERSON, PROBST & WHITE, ARCHITECTS

DETAIL OF LOWER STORIES FROM CHICAGO RIVER



DETAIL OF MAIN ENTRANCE

WRIGLEY BUILDING, CHICAGO

GRAHAM, ANDERSON, PROBST & WHITE, ARCHITECTS

Architecture and Illumination

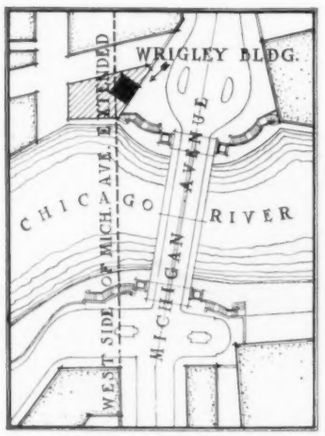
A NOTABLE EXAMPLE IN THE WRIGLEY BUILDING, CHICAGO

THE most notable of the buildings built in Chicago as a result of the extension of the business district and the development of the lake front improvements is undoubtedly that of the Wm. Wrigley, Jr. Co. This structure, with its 34 stories, is placed where Michigan avenue, after crossing the Chicago River, makes a slight turn and the orientation of the building almost upon the axis of the avenue renders it visible at a great distance. The structure, because of its height and striking tower form, would be notable anywhere, but it gains greatly in dignity by reason of its being placed where owing to the bridge plaza upon the east, the river upon the south, and streets upon the west and north, it is effectually separated from adjoining buildings which might challenge its architectural dominance or mastery. Here, secure in comparative isolation, this vast structure of white terra cotta and of ornate design rises to a height of 400 feet.

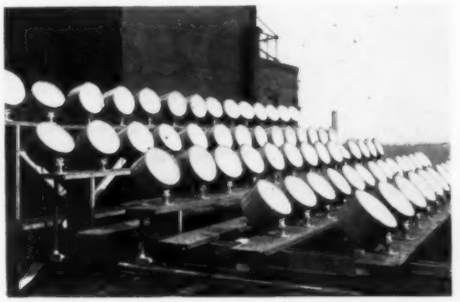
Michigan Avenue Facade of Wrigley Building at Night

The architects of the Wrigley building have made an excellent choice of design for a structure which on account of its location will always be of striking importance. The three lower stories above the street level form a base for the building, in the main facade of which is placed the chief entrance which extends through the third floor. At the twentieth story the setbacks develop the tower, which is crowned with a cupola.

Although its appearance at any time is impressive, it is particularly so at night when fully illuminated by a system which is itself unique, and which is said to be the most complete illumination of a single building in the world. The illumination is produced by the use of powerful projectors which flood the structure with a brilliance which is accentuated by the dazzling whiteness of the building itself. The lighting increases in intensity as the building rises until the tower is all aglow. To produce this marvelous illumination requires the use of 198 projectors with 500-watt lamps and 16 projectors with 250-watt lamps, thus making the total current consumption 103,000 watts, requiring about 80 horse power. The approximate candle power cast upon the building from all these units is somewhat more than 25,000,000; the cost of installing the illumination will approximate $30,000, and the cost of operating it each night, including maintenance, lamp renewals and washing the building as often as is necessary, will be about $80. Certainly it is for the Wm. Wrigley, Jr. Co. the most striking possible form of advertising, indelibly impressing upon the minds of tens of thousands of people daily the Wrigley Chewing Gum product.



At left is a plan showing location of Wrigley Building and position of tower so that it is visible from South Michigan Avenue. Below is a group of projectors



Housing in England

THE FAILURE OF THE GOVERNMENT'S POST-WAR HOUSING ENTERPRISE

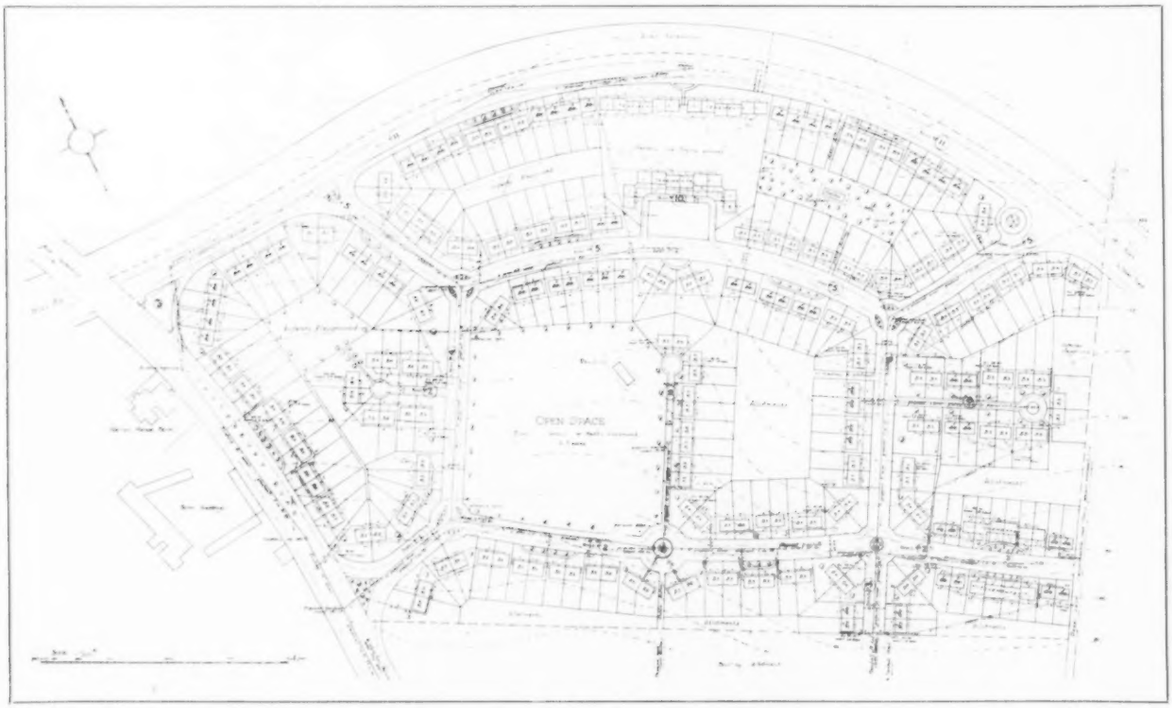
By H. J. BIRNSTINGL, A.R.I.B.A.

THE government's great housing scheme has utterly collapsed. A stupendous opportunity for social reform, for improving the housing conditions of the nation, has been wasted, owing partly to mismanagement and partly to a combination of circumstances brought about by unforeseen events. Yet now, in the midst of terrible wreckage, it is possible to see that when the debris has been removed—at enormous cost to the country—something of value will remain, and by those who are yet grappling with the great problem certain lessons are to be learned. It may therefore be of interest to trace the career of the "Government's Housing Program," which figured so conspicuously in the first post-war election in 1918, promising so much.

Already, in July, 1917, a committee was appointed by the President of the Local Government Board "to consider questions of building construction in connection with the provision of dwellings for the working classes in England and Wales and report upon methods of securing economy and dispatch in the provision of such dwellings." A very thorough investigation was made by this committee and a lengthy report was published in October, 1918. In July, 1919 the Housing and Town Planning Act was passed and most of the recommendations made by this committee, whose members included such well known architects as Sir Aston Webb and Raymond Unwin, were embodied in the Act or in the regulations arising therefrom.

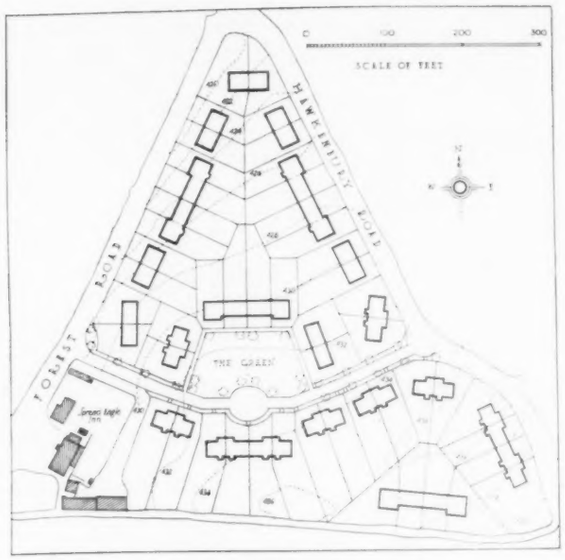
This Act made it incumbent upon the local authorities of boroughs and of urban and rural districts to undertake a detailed survey of the housing needs of their districts in connection with providing new houses, the reclaiming of slum areas, and the demolition of unfit houses, and in preparing a program for the three years terminating on July 30, 1922. Realizing the impossibility of providing houses on an economic basis, the government offered considerable financial assistance in building. However great might be the loss incurred by a local authority in providing the necessary houses, the financial liability of the authority would not exceed a greater amount than is produced by a penny rate in the pound. The remaining deficit was to be met by the national exchequer.

As the government was virtually financing the scheme, all the undertakings of the local authorities had to receive its approval. When sites were selected they were inspected by government officials; their prices had also to be approved. The



Layout for Housing Scheme at Folkestone, Showing Typical Treatment

A. E. Nichols, Engineer



Plot Plan of Royal Tunbridge Wells
Cecil Burns, Architect

layouts and house plans were then submitted for approval, and finally, before a local authority could enter into a contract for the erection of houses or the construction of roads or sewers, it was necessary that the bids and the terms of the contracts be approved. In order to carry out this work, and generally to assist the authorities in their task, 12 offices were opened by the Ministry of Health—the department responsible for housing—in different parts of England and Wales, each under the supervision of a "Housing Commissioner," who was assisted by a technical staff of inspectors, surveyors and architects. Likewise, at headquarters a staff of experts was engaged which included such men as Raymond Unwin and Michael Bunney. Most of the men comprising these staffs were young and zealous and had seen service in the war; they were, moreover, full of enthusiasm for the work and for the high ideals and standards which the Ministry of Health, under Dr. Addison, maintained.

In order further to assist the local authorities, various manuals were issued for their guidance; these dealt with plans of houses, details of roads, methods of redeeming slums and of converting large houses into flats, and army huts into temporary houses. Moreover, a fortnightly periodical called *Housing* was published by the Ministry, which contained the latest information and showed the progress that was being made in different parts of the country.

By October, 1919 the scheme was fairly launched, but there were innumerable difficulties to be overcome. Local authorities were suspicious of the government's good faith, and doubted the statement that their liabilities would be limited to a rate of a penny in the pound. The plans which they prepared were often not in conformity with the government's new standards of housing, or they were extravagant in use of road frontage or floor space, and there was a shortage of material and of labor. By dint of hard work on the part of the government officials the first of these difficulties was, for the most part, overcome. The inspectors interviewed the officials of local authorities and attended committee meetings, and the architects often entirely recast the plans which were submitted to them for approval.

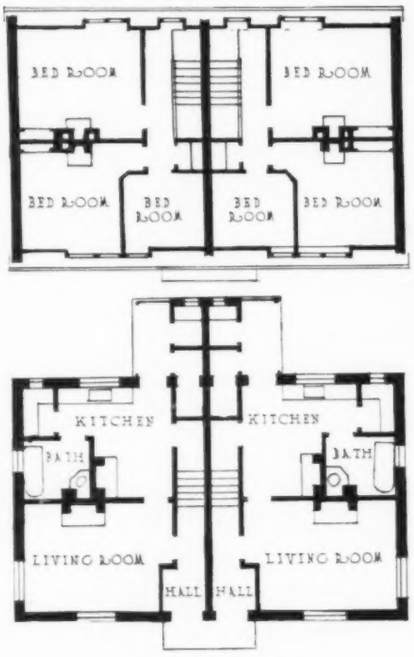
In the early spring of 1920 a veritable campaign was launched by the government to endeavor to persuade authorities to hasten the development of their schemes and avail themselves of the fine building weather of the summer and autumn. As a result of these efforts, the number of houses for which bids were approved, increased during the three months ending March 31 from 16,000 to 85,250. Meanwhile, at the end of 1919 another Act was passed by which any private individual building a dwelling house of a certain size and quality and conforming to certain not very stringent regulations could obtain a grant of money varying from £230 to £260 in accordance with the size and accommodation provided; the floor area of the house was not to be less than 700 square feet or exceed 1400 square feet. This, however, has not proved a successful method of providing houses, for although many have been built, they have often failed to provide accommodations for the class of people whom the Act was designed to

Pair of Brick Cottages at Tunbridge Wells
C. H. Strange, Architect

assist. Thus a rich man could build for himself a week-end cottage, or a lodge for his chauffeur or gardener, and claim a contribution of £260 from the taxpayers, or, to take the other extreme, a jerry builder could erect a shanty of the poorest materials, badly planned, with but the barest necessities, miserably built and of desolating ugliness, and claim state assistance to the extent of £260.

Another method by which the government sought to encourage domestic building was by offering financial assistance to building societies, or Public Utility Societies, as they are called. These schemes required the approval of the Ministry of Health, stage by stage in a manner similar to the working of a local authority's method, but the plan of giving financial assistance differed. A loan might be obtained from the Public Works Loan Commissioners for three-quarters of the cost of the approved scheme, to be repaid over a period not exceeding 50 years by equal semi-annual payments of principal and interest. The societies were furthermore entitled to a subsidy, equivalent to 50 per cent up to 1927 and thereafter 30 per cent of the annual loan charges.

Such then was the condition of affairs during 1920, and by the end of the year the number of houses for which contracts were signed by local authorities or Public Utility Societies was 140,000 and 11,000 houses were completed. Under the terms of the government grants to private persons a further 4500 houses were actually completed and certificates had been issued sanctioning the building of a further 26,500, implying a commitment on the part of the government of £6,500,000. Meanwhile, however, prices were steadily rising, and many of the contracts were let at the top of the market, prices reaching their maximum in about October or November, 1920. By this time the average price of a house containing two sitting rooms and three bedrooms, a kitchen, pantry, bathroom, coal cellar and toilet was about £950 and that of a similar house, containing only one sitting room, about £850, and the Ministry began to be alarmed at these ever growing costs.



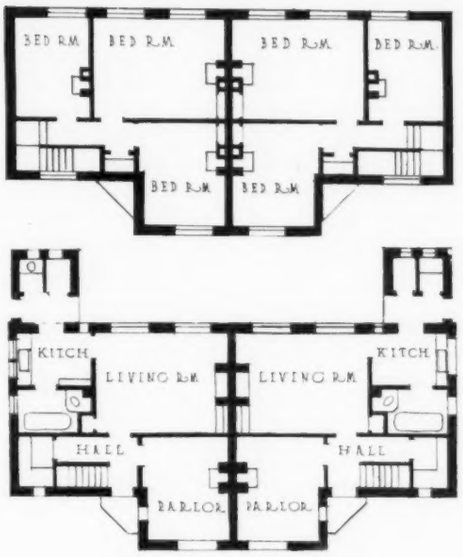
Typical Cottage Plans
Housing at Westhampnett

At the end of 1920, efforts were slackened and scarcely any new contracts were approved. This seemed a wise course, and it was presumed that when prices had fallen, by the spring of 1921, fresh efforts would be made to push forward the great work of providing houses, for the moment was ripe to achieve material results from the preceding two years of work. The enthusiasm of local authorities had at last been aroused; labor, whose earlier failure to co-operate had proved a very serious obstacle, at last seemed willing to increase its output; plans had been prepared for extensive building, and in many cases new roads to accommodate the houses had been built and quantities of materials had been acquired, in fact, the great machine for the provision of houses had at last been started. Yet this was the moment chosen by the government to drop the whole enterprise and to repudiate its pledges to the country to provide houses at any cost for the returned soldiers.

Cottages for the Westhampnett Rural District Council
John Dovaston, Architect

It is not possible—nor

desirable—to consider the justification of the coal strike which lasted from April until July this year, and disorganized the industry of the country, but there is little doubt that the cost of it so depleted the national resources that it became impossible for the government to enter into any new commitments that might add to its already overwhelming burden of expense. This, coupled with the cry—often utterly unconsidered and indiscriminate—for national economy, which, inspired by a section of the press, swept over the country in the spring and summer of this year, killed the national housing movement. The suddenness and thoroughness of the abandonment may be judged by the fact that on September 30, 9 of the 12 regional housing offices were closed, a technical staff of nearly 900 had been dismissed, effecting a saving in salaries alone of £250,000, and yet the provisions of the 1919 Act were to continue until July 30, 1922.



Typical "Parlor" Cottage Plans
Housing at Westhampnett

The course of procedure that has been adopted involves very serious financial losses to the country, for, although actually less money will be spent than if the full program had been completed, much of it will now be spent on the machinery constructed to produce houses but not on the houses themselves. This arises largely from the fact that, on the presumption that the pressing need for 500,000 houses was to be met, provision had already been made for the erection of this number. Thus, by July, 1920, 57,000 acres of land had been acquired for housing purposes, sufficient, at 10 houses to the acre, to accommodate more than the half million, yet the number of houses for which contracts are signed is only 157,500 and this number represents the maximum that will now be built. The surplus land must be re-sold and the legal and other expenses incurred in the transactions of both buying and selling represent a dead loss. Similarly, plans for 280,000 houses have been approved. These must be paid for, but half the houses are not to be built; this again represents a dead loss. Another enormous waste is incurred through the miles of new roads that have been constructed and sewered to accommodate the houses that will now probably never be built. The average cost of street work and sewers is £50 per house. These roads must either be maintained by the local authorities, thus constituting an additional burden on the taxpayers, or they must be allowed to fall into disrepair. There are the materials that have been purchased. When all the houses now contracted for have been built the government will find itself with a surplus of some 400 million bricks, to name but one item, which it will be able to dispose of only at a very serious loss, since the contracts by which the bricks were bought were extremely loosely drawn up, enabling the makers to sell bad bricks at top prices; moreover, these huge stocks are now so congesting the makers' yards that damages are being claimed for storage. Finally, the government is so anxious not to spend more money on houses, that it is actually paying builders, to whom contracts have been let, sums *not to build* houses. At Richmond a sum of £40 per house is being paid to a builder as an inducement not to complete

Pair of Cottages for Westhampnett Rural District
John Dovaston, Architect

his contract. The overhead charges of the government administration were computed some months ago at £2 10s per house. This figure will now be greatly exceeded.

These facts represent the debit side of the enterprise, but fortunately it has a credit side, which shows itself, for the most part, in a less material way. Out of a need of 500,000 houses, about 160,000 will actually have been built; a small percentage, but nevertheless these figures represent the largest contribution that any government has made towards the solution of one of the acutest post-war problems. But there are even more far-reaching results. The whole standard of working class housing has been raised. There is scarcely a parish in the country that is not now familiar with improved methods of estate development, with the necessity of avoiding overcrowding, of giving due consideration to such matters as appearance, proper ventilation, of planning houses with a view to minimizing the work required for their upkeep, and of providing baths and other conveniences. These are lessons that, once learned, will not be forgotten, and there is little doubt that, however the provision of houses is to be effected in the future, estate development will be on the new lines and not on the old, and the long rows of hideous and monotonous terraces, with their filthy back courts and their rear projections shutting out the sun and air, will be things of the past.

The question now naturally arises as to whether the mistakes that were made might have been avoided. The success of the scheme would probably have been assured, despite all obstacles, if it had not been turned into a matter of party politics. In the purchase of materials by the government the most inexcusable blunders were made. Contracts with brickmakers were so full of loopholes that the makers were able to do as they pleased and to postpone supplying the government until prices had reached their maximum; moreover, large quantities of materials were bought that were entirely unsuitable for cottage building, such as large cooking ranges at £14 each. All this could have been avoided by drawing proper contracts, by purchasing the total output of certain brickyards, and by buying only materials which would be of use for the particular class of building concerned.

Seeing the determined efforts that were being made by contractors throughout the country to keep up prices, the government should have given greater encouragement to direct labor schemes and to the Building Guilds. Many municipalities already possessed works departments of which advantage should more often have been taken; they had, moreover, the organization for purchasing materials. Under adequate supervision these staffs and organizations might have been developed for building. Where this course was adopted it usually resulted in cheaper houses.

As this article is being written the Departmental Committee appointed to inquire into the high cost of building has issued its report. It constitutes a strong defense for the attitude of labor, and emphasizes the fact that "houses in great numbers are absolutely essential in the interests of public health and humanity." Who is to provide them? The government is still in a position to fill the interim that must now occur between the time of the abandonment of the moribund public enterprises and the day of the revival of private enterprise, by allowing local authorities to sell this surplus land on specially favorable terms to bona fide constructors of working class dwellings, and by selling stores of materials in the same way. Housing activity must revive, for a vital demand will invariably be met.

Group of Eight Houses for Westhampnett Rural District Council
John Dovaston, Architect

ENGINEERING DEPARTMENT

Charles A. Whittemore, *Associate Editor*

Power, Light and Heat in Large Buildings

THE SELECTION OF ECONOMIC MACHINERY AND COSTS OF OPERATION

By JAMES A. McHOLLAN

Vice-president of The R. P. Bolton Company, Consulting Engineers

THE expense of operating boiler and engine room machinery in a large building to provide heat, light, power and elevator service is an item which may range as high as 40 per cent of the entire outlay upon the operation of the building. It is therefore a matter of real interest to the architectural profession to be fully informed on the most economical selection of such machinery that can be made, so that not only the initial investment but the operating costs after installation may be kept down to a minimum. The architect is especially interested in economies or innovations effected by those who operate their buildings as such practices have an important bearing on the commercial feasibility of new structures. A large building is primarily a new business enterprise, designed to earn a reasonable return on the capital invested, and if a reduced expenditure upon machinery and a low cost of operation can be assured in advance, some of the difficulties which discourage the investment of money in building operations, especially during periods of high construction costs, will be removed.

One of the most important economies in building operation is the general adoption of purchased electric power and electrically operated machinery in conjunction with the use of low pressure steam. In the economical new building of today, electrically operated machinery is used almost exclusively, such appliances costing less to install, occupying far less floor space and requiring less attention and expense to operate. The heating of buildings and operation of hot water apparatus are, however, unsolved insofar as the substitution of electricity for steam is concerned, and must be by steam. It is generally found that power plant machinery designed to operate in this manner can be installed for about one-third the cost of other systems and is from about 17 to 30 per cent less expensive to operate.

Illustrating the investment required for machinery in boiler and engine rooms these figures will show the reduced cost in three typical new buildings of applying the use of a supply of purchased power in conjunction with low pressure steam supply as compared with the installation of more complex systems:

TYPE OF BUILDING	VOLUME CU. FT.	PLAN I Investment required for high pressure boilers, private electric power plant, piping system and auxiliary machinery arranged to operate with high pressure steam	PLAN II Investment required for heating boilers, piping system in boiler room and electric auxiliary machinery for low pressure plant, electricity being purchased from a public source of supply
Factory	4,000,000	$117,000	$32,000
High class apartment hotel	900,000	$60,000	$15,000
Office and printing bldg.	2,750,000	$163,000	$28,000

These figures are based on prevailing prices, but the same proportional saving in initial investment can be demonstrated in a large structure of any type. These amounts include the cost of only engine and boiler room machinery and do not include the cost of elevators, heating radiators, plumbing and other building equipment, the investment for which is practically the same under both plans.

In view of these wide differences in investment it is of interest to study the comparative costs of operation of the machinery after a building is put into service. Perhaps the most interesting case which has come within the writer's experience is that of a building in which a comparatively new power plant installation, carefully designed and most efficiently operated, was abandoned by the building owners after a few years' use in order to reduce expenses in operation. The cost of converting the equipment so as to make possible the boiler and engine room machinery being operated electrically and the heating service to be supplied on a closed system, amounted to $13,000. A saving of $21,592 was effected so that the entire expense of alteration was saved by the economies secured in nine months' operation. This detailed information will be of interest for purposes of comparison with other structures, existing or proposed:

Type of building	Offices and printing
Volume	2,750,000 cu. ft.
Height	14 stories

Prior to the abandonment of the use of the high pressure steam system the costs of operation were

$90,384 per year, made up of these items:

Coal	$64,345
Labor	20,184
Oil	1,398
Ash removal	1,257
Repairs (to private electric power plant) and supplies	3,200
Total per year	$90,384

This operating expense provided these various services:

I Building service	II Methods of operation or production
Electric light and power	Supplied from the electric power plant operated by high pressure steam
House water pumping	High pressure steam pumps
Fire protection, water and air under pressure for sprinkler system	High pressure steam pumps and compressors
Building heating	Exhaust steam from electric power plant
Hot water supply	Exhaust steam from electric power plant
Industrial steam for stereotype and other purposes	High pressure steam from main boilers

Upon the installation being changed and the machinery operated with purchased electricity the arrangement of the equipment was such as is shown in the accompanying Diagram I, from which is gathered a striking illustration of the reduced number of appliances required to be maintained and used. The actual expenses of operation under this rearrangement were:

Coal	$12,000
Labor	4,150
Oil	37
Ash removal	260
Purchased electricity, 1,462,772 kw. hrs.	50,082
Purchased gas	2,263
Total per year	$68,792

Under the revised plan of operation, the building services were provided in this manner:

I Building service	II Method of operation or production
Electric light and power	Purchased from public supply company
House water pumping	Electrically operated automatic control
Fire protection, water and air under pressure for sprinkler system	Electrically operated automatic control
Building heating	Low pressure steam
Hot water supply	Gas-fired boiler with automatic control
Industrial steam for stereotype and other purposes	Gas-fired boiler with automatic feed and pressure regulation

This is only one example of an economic development such as is taking place over the entire country. The rising expenses of operation are making obsolete many installations which were at one time considered the most perfect of their class. Many buildings have already been changed to operate electrically, the general experience being that the cost of the change is saved within a maximum period of two years. The engineers of a large public utility corporation, owners of many real estate properties, whose operations extend over the entire country, have checked up the wastages chargeable to the use of complex engine room systems and are now proceeding to follow the example of other real estate operators in adopting the newer and simpler methods.

Large hotels are commonly supposed to be dependent upon the use of high pressure steam to a greater degree than any other type of large building, yet a modern hotel can be designed so that only a few minor pieces of apparatus have to be operated with high pressure steam, the largest of which, curiously enough, is the mangle of the hotel laundry. A small automatic gas-fired boiler is provided for this purpose—compact, self contained, automatic and economical in its operation—placed beside the mangle which it supplies. For all other hotel service, electricity, low pressure steam and gas provide economical and simple operation. The architect or engineer of today who plans installations to operate with high pressure steam for even the largest hotel is diverting his clients' funds to purposes for which no operating benefit, either practical or economic, can be secured. A hotel is run on a narrower margin of profit than the majority of business enterprises and every item of investment should be restricted to that which will directly earn revenue for the owner or operator or which is absolutely necessary to complete the physical structure of the building. It may be of interest to know that a well known chain system of hotels in New York, noted for its careful and scientific methods of management, has just recently reorganized the power plants in the properties in its system so that only low pressure steam and purchased electricity are used.

New buildings designed to operate with low pressure steam and purchased electricity show substantial advantages in the use of coal and power as compared with older types of similar buildings in which a larger investment has been made for machinery and in which a higher expense is required per year for the same kind of building service. To illustrate this point, the comparison is made of two large buildings, one of which is equipped to operate with high pressure steam apparatus and the other for operation with low pressure steam and purchased electricity:

	Office building, equipped with high pressure steam and electric power plant	Office building, equipped for purchased electricity and low pressure steam operation
Volume	3,200,000 cu. ft.	6,500,000 cu. ft.
Total steam used per year	78,400,000 lbs.	25,200,000 lbs.
Total electricity used per year	*700,000 kw. hrs.	950,000 kw. hrs.

*Higher consumption of electricity than is usually found in a building of this size is due to design, long interior corridors, small windows, etc.

This following tabulation shows the different methods by which the building service was provided in these two structures:

Building service	Office building, equipped with high pressure steam and electric power plant	Office building, equipped for purchased electricity and low pressure steam operation
Electric light and power	High pressure steam	Purchased electricity
House heating	Exhaust steam	Low pressure steam
Water heating	Exhaust steam	Low pressure steam
Elevator service	High pressure steam	Purchased electricity
Water pumping	High pressure steam	Purchased electricity
Auxiliary pump operation	High pressure steam	Purchased electricity

It must not be assumed, however, that in existing buildings equipped with high pressure steam installations similar economies can be obtained merely by shutting down the engines and generators of a private power plant and replacing their operation with a supply of purchased electricity. While substantial economies may result from this procedure, it is essential in every building, new or existing, where electric light and power are to be purchased, that every piece of steam-operated machinery be rearranged to operate electrically if the full measure of economy is to be realized. The entire system of steam-piping, traps, tanks, heaters, etc., must also be rearranged so as to secure the maximum economy in operation in conjunction with a purchased supply of electric power. These figures of cost show the actual experience of the owner of a factory building who merely shut down his private electric power plant and purchased electricity, but did not convert the other steam-using appliances for economic results under the changed system. The building in question was five stories high, having a volume of 800,000 cubic feet.

Under the system of high pressure steam supply and with the private power plant in operation, the annual costs were:

Fuel, 2320 tons	$18,972
Labor, 4 men	6,900
Ash removal	1,392
Repairs (average) and supplies	1,000
Electricity purchased (breakdown service)	960
Water chargeable to electric plant	250
Insurance	140
Total	$29,614

Upon shutting down the private power plant and purchasing electricity, but making no other changes on the equipment or operating methods, the annual costs of operation were:

Fuel, 2000 tons	$16,200
Labor, 3 men and 1 man for 6 mos.	6,290
Ash removal	1,200
Repairs (average) and supplies	300
Water chargeable to steam plant	180
Insurance	125
Electricity purchased, 270,000 kw. hrs.	12,760
Total	$37,055

The machinery was then rearranged so that all the steam-operated pumps and other appliances were operated electrically, except building heating, hot water apparatus and industrial steam for tenants' use. The latter service was furnished from a new auxiliary vertical steam boiler, with a separate steam piping system specially installed for the purpose. All unnecessary usages of steam were thus eliminated, and under these conditions the costs of operation were:

Fuel, 1100 tons	$8,900
Labor, 2 men and 1 man for 6 mos.	3,500
Ash removal	660
Repairs (average) and supplies	100
Insurance	75
Electricity purchased, 280,000 kw. hrs.	13,140
Total	$26,375

These figures show the effect of a correct operating system in reducing expenses of operation and at the same time explain why so much controversy has centered around the question of central station *versus* private power plant operation. The full

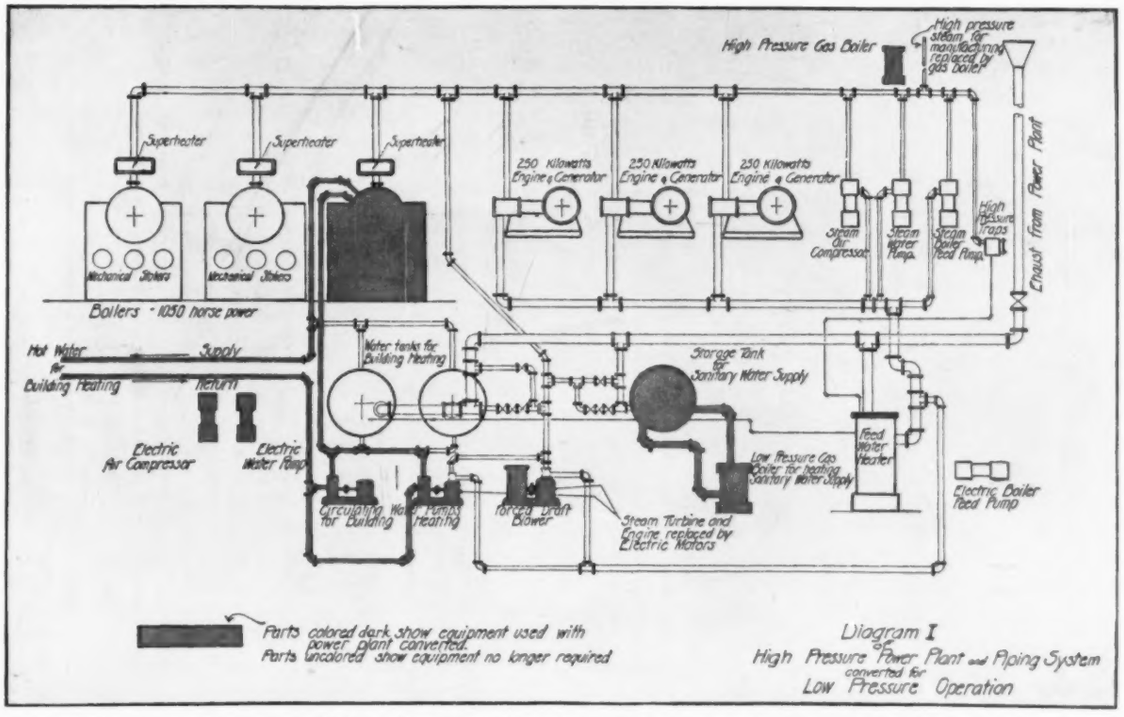

High Pressure Gas Boiler
High pressure steam for manufacturing replaced by gas boiler
Superheater
Superheater
Superheater
250 Kilowatts Engine & Generator
250 Kilowatts Engine & Generator
250 Kilowatts Engine & Generator
Steam Air Compressor
Steam Water Pump
Steam Boiler Feed Pump
High Pressure Traps
Exhaust from Power Plant
Mechanical Stokers
Mechanical Stokers
Boilers - 1050 horse power
Hot Water for Building Heating
Supply
Return
Water tanks for Building Heating
Storage Tank for Sanitary Water Supply
Feed Water Heater
Electric Air Compressor
Electric Water Pump
Low Pressure Gas Boiler for heating Sanitary Water Supply
Electric Boiler Feed Pump
Circulating Water Pumps for Building Heating
Forced Draft Blower
Steam Turbine and Engine replaced by Electric Motors
Parts colored dark show equipment used with power plant converted.
Parts uncolored show equipment no longer required
Diagram I
High Pressure Power Plant and Piping System converted for Low Pressure Operation

Diagram I. Comparison of Independent Power Plant with Equipment Required when Purchased Current Is Used

measure of economy in operation with purchased electricity, in large buildings, can be obtained only when all power machinery is arranged to operate electrically. Steam should be used only for warming, cooking or other similar processes. If this plan is followed the result is a simple arrangement of machinery, obtained at low cost and inexpensive in operation.

Another development in the financial success of buildings, which is of interest to architects and engineers, is the sub-metering of electricity by which the tenants in office buildings, apartment houses and lofts are charged for electricity in exact ratio to the amount used. It was at one time a general practice of real estate operators to supply free electricity to tenants. This resulted in excessive use and waste of power and light. It is an axiom in building operation that a service gratuitously afforded is seldom appreciated and is frequently wasted. This condition became aggravated as electrical devices for the apartment and office increased in number, and a general policy came into effect, first in loft buildings, then in apartment houses and now being generally extended to the largest office buildings, of metering the electricity used by each tenant and charging for the amount used at the same price which would be charged if the tenant had purchased direct from the public supply company. By applying this system the owner can purchase a total supply current for the entire building at wholesale rates and re-sell to his tenants at the regular retail rates. The building thus bears only the expense of lighting public space, of power for elevators and for minor pumping service. In many buildings this system returns a profit to the owner, due to the difference between the wholesale and retail rates for electricity. In loft and manufacturing buildings the margin from this source usually meets the expense of the lighting of halls and stairways and power for elevator service. This system of sub-metering electric current is of special interest to architects in its effect on the financial success of a proposed new structure, as every reduction in the expenditure which falls on the owner makes it easier to justify an investment in building operation.

Allowances must be made for the cost of providing and installing the electric meters in the offices, stores or apartments. The complete cost with wiring loops, meter boards, cutouts, etc., for the usual building is about $40 each. Under this system the cost of power in loft buildings and of light in office and apartment buildings may be disregarded by the architect who has to consider only that used for public lighting and that required to operate elevators and water pumps.

Another development in machinery design which has an important effect in the operating expense of apartment houses is the modern unit type of refrigerating plant. In an apartment house of the highest class it is customary to furnish refrigeration service to each apartment, and until recent years the usual method was to provide a refrigerating plant in the basement, consisting of a steam engine or motor, refrigerating compressor, brine pumps, circulating water pumps and auxiliary apparatus of sufficient capacity for the requirements of the entire building. Cold brine to cool the boxes was circulated through a piping system.

The development of the so-called unit refrigerator, each machine complete in itself and placed in the apartment to be served, does away with the expensive installation of brine piping, the life of which is always limited. In many buildings such systems of piping have failed, through corrosion, in less than six years after installation and replacement has been found impracticable, due to difficulties and expense in redecorating. The cost of these self-contained unit machines is approximately $1,000 per unit, installed complete, so that in a high class apartment house with 18 apartments the investment is about $18,000, which is no more than a central plant with piping would involve. The expense of operation is of course borne by the tenant instead of by the building owner, as even in the highest class of apartment buildings it is now the general practice for the tenant to pay for all electricity used in his own service. In a building of 18 apartments the cost of operating a central refrigerating plant was about $2,500 per year, but when it was equipped with the unit refrigerators in each apartment, the owner's expenses were reduced to $540 per year.

Coal Usage in Buildings on Low Pressure

Coal usage in buildings equipped for operation with low pressure steam and purchased electricity varies in proportion to the volume. Unusual exposures or corner buildings may show somewhat higher rates of usage in fuel, but the difference due to such conditions is not so great but that the quantities given here may be safely used, as the figures are from actual records from buildings in operation:

Type of building	Volume	Coal used; net tons	Coal used; net tons per 1,000,000 cu. ft. of volume
Office	6,500,000	1796	277
Office	2,032,000	960	†480
Office	18,500,000	5199	280
Office	910,000	350	390
Printing	2,750,000	1000	320
Manufacturing	1,500,000	480	320
*Hotel	1,500,000	1200	*800
Institution	11,225,000	4293	370

†Tower building
*Also includes steam for hotel kitchen and hot water supply

Architects are now devoting greater attention to the question of expense in the operation of their buildings, and the foregoing information may therefore be of interest not only from the viewpoint of costs and quantities of heat, light and power, but also for the information on operating policies favored by those charged with the operation of large buildings. Special acknowledgment is due by the writer to A. R. Heath, Vice-president of the New York Service Company, with whom he has been associated in gathering the information here presented.

Steel Design for Buildings

PART III. THE DESIGN OF A PLATE GIRDER (CONTINUED)

By CHARLES L. SHEDD, C.E.

IN the preceding installment, owing to restricted space, only one table for allowable flange stresses was given. This was Table V, for two 6 x 6 angles with 13″ cover plates. There are given here two others, one, Table VI, for 6 x 6 angles and a 14″ cover plate and the other, Table VII, for 6 x 4 angles and a 9″ cover plate. The 14″ cover plates are a little more economical for heavy girders than narrower plates and if the top flange is unsupported laterally for some distance it is stiffer to resist buckling sidewise.

The narrower plates are especially good for double girders where the width is limited. Two girders side by side with 9-inch cover plates make a very good section to carry a plate and angle column with a 10-inch web, when the web of the column is perpendicular to the webs of the girders. The columns carrying such a pair of girders can readily be made facing the same way as the column carried, so that the webs of the girders may pass directly by the flange plates of the columns and be riveted directly to them with only a small seat angle for erection purposes. This makes a very rigid connection and one that can be easily erected. The different widths of flange plates for the girders may be used to suit various conditions which may be encountered.

As there is but one gage line in the 4-inch legs and two in the 6-inch legs, the sections are so designed that the area of the plates does not exceed the area of the angles in order that when the rivet pitch is figured between the flange angles and the webs, the rivets between the flange plates and angles will be sufficiently strong if spaced opposite those in the inside gage lines of the angles.

Table VIII corresponds to Table IV, showing the distance from the back of the angles to the center of gravity of the flanges.

When this distance is plus, the center gravity is in the angles, but when it is minus it is located in the plates. Some designers specify that no section shall be used where this distance is a negative quantity. Occasionally, when the shear is too great on a short shallow girder, 7/8-inch rivets have to be employed, when a new but similar set of design tables will have to be used.

On light work smaller angles are used and in cases of emergency, when rolled beams were hard to obtain, plate girders have been substituted for beams as small at least as 20″ Is. In designing these very shallow girders it is best to use an exact method in designing the section, that is to compute the sectional modulus of the section to be used.

To determine the rivet pitch on these shallow girders the amount of longitudinal shear per lineal inch should be obtained from the value of SQ/I, where S is the total shear on the girder, Q the statical moment of the flange about the neutral axis of the girder, and I the moment of inertia of the entire girder section.

When no flange section can be found strong enough to resist the bending moment on the girder, the strength of the flange may be increased by introducing some plates 9″ wide under the flange angles. This allows the use of an extra row of flange rivets through these plates and the web inside the rows through the flange angles. In computing the rivet pitch for such a section care should be taken to realize that this new row of rivets does not help to develop any flange stress except in these new plates. It is therefore necessary to compute the rivet pitch twice, once for the planes of shear between the web and these plates and once between these plates and the flange angles.

ALLOWABLE FLANGE STRESSES

2-6"x6" ⌊s	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"	7/8"
Gross A.	87.2	101.2	115.0	128.6	142.2	155.6	168.8	181.8	194.6
Net A.	80.6	93.6	106.2	118.8	131.2	143.6	155.6	167.6	179.2
do 2h	74.0	85.8	97.4	109.0	120.4	131.6	142.6	153.4	164.0
Flg St No 13	129.0	149.8	170.0	190.0	210.0	229.8	249.0	268.2	286.8
14"x 5/16	179.6	198.4	217.0	235.6	253.8	271.8	289.4	306.6	323.6
3/8	191.9	210.7	229.3	247.9	266.1	284.1	301.7	318.9	335.9
7/16	204.1	222.9	241.5	260.1	278.3	296.3	313.9	331.1	348.1
1/2	216.4	235.2	253.8	272.4	290.6	308.6	326.2	343.4	360.4
9/16	228.6	247.4	266.0	284.6	302.8	320.8	338.4	355.6	372.6
5/8	240.9	259.7	278.3	296.9	315.1	333.1	350.7	367.9	384.9
11/16	253.1	271.9	290.5	309.1	327.3	345.3	362.9	380.1	397.1
3/4	265.4	284.2	302.8	321.4	339.6	357.6	375.2	392.4	409.4
13/16	277.6	296.4	315.0	333.6	351.8	369.8	387.4	404.6	421.6
7/8	289.9	308.7	327.3	345.9	364.1	382.1	399.7	416.9	433.9
15/16	302.1	320.9	339.5	358.1	376.3	394.3	411.9	429.1	446.1
1	314.4	333.2	351.8	370.4	388.6	406.6	424.2	441.4	458.4
1 1/16	326.6	345.4	369.0	382.6	400.8	418.8	436.4	453.6	470.6
1 1/8	338.9	357.7	376.3	394.9	413.1	431.1	448.7	465.9	482.9
1 3/16	351.1	369.9	388.5	407.1	425.3	443.3	460.9	478.1	495.1
1 1/4	363.4	382.2	400.8	419.4	437.6	455.6	473.2	490.4	507.4
1 5/16	375.6	394.4	413.0	431.6	449.8	467.8	485.4	502.6	519.6
1 3/8	387.9	406.7	425.3	443.9	462.1	480.1	497.7	514.9	531.9
1 7/16	400.1	418.9	437.5	456.1	474.3	492.3	509.9	527.1	544.1
1 1/2	412.4	431.2	449.8	468.4	486.6	504.6	522.2	539.4	556.4
1 9/16	424.6	443.4	462.0	480.6	498.8	516.8	534.4	551.6	568.6
1 5/8	436.9	455.7	474.3	492.9	511.1	529.1	546.7	563.9	580.9
1 11/16	449.1	467.9	486.5	505.1	523.3	541.3	558.9	576.1	593.1
1 3/4	461.4	480.2	498.8	517.4	535.6	553.6	571.2	588.4	605.4
1 13/16	473.6	492.4	511.0	529.6	547.8	565.8	583.4	600.6	617.6
1 7/8	485.9	504.7	523.3	541.9	560.1	578.1	595.7	612.9	629.9
1 15/16	498.1	516.9	535.5	554.1	572.3	590.3	607.9	625.1	642.1
2	510.4	529.2	547.8	566.4	584.6	602.6	620.2	637.4	654.4
2 1/16	522.6	541.4	560.0	578.6	596.8	614.8	632.4	649.6	666.6
2 1/8	534.9	553.7	572.3	590.9	609.1	627.1	644.7	661.9	678.9
2 3/16	547.1	565.9	584.5	603.1	621.3	639.3	656.9	674.1	691.1
2 1/4	559.4	578.2	596.8	615.4	633.6	651.6	669.2	686.4	703.4

Table VI

It is occasionally necessary to splice the webs or flanges where the girders are very long. Where only one splice is required in the web it may be placed near the middle of the girder or, in other words, near the point of zero shear where the web is doing the least work. These web splices are made in varying forms, depending upon the taste of the designer. Two common types were shown in Fig. 10 of the article appearing in the June number of THE FORUM. The "a" type is preferred by the author as it allows a simpler and more exact analysis to be made. Two origins of stress must be considered in making this design, that is the stress from the shear on the girder and the stress from the bending. The rivets on each side of the joint in the web must be capable of resisting these stresses. The shear must be considered as being transferred from the web to the splice plates at the center of gravity of each group of rivets. This causes a moment on the group equal to the shear multiplied by half the distance between these centers of gravity, and this moment should be added to the moment on the girder resisted by the web and the rivets designed to resist the resultant of the stresses caused by this moment and the vertical shear.

The stresses caused by the moments are proportional to the distances of the rivets from the center of gravity of the group and the moments are therefore proportional to the squares of the distances. If a summation were made of the squares of the distances of each rivet from the center of gravity of the group, and the moment divided by this summation (care being taken to use inches in the summation of the squares and inch-pounds for the bending moment), the result would be the stress on an imaginary rivet one inch from the center of gravity of the group, and if this were multiplied by the distance to the rivet the most distant from the center of gravity, the result would be the stress on that rivet due to the moments. This stress would act in a direction at right angles to a line connecting the rivet with the center of gravity, and if this were shown diagrammatically it could be combined with the vertical stress found by dividing the shear by the total number of rivets in a group and the resultant would be the stress on the most strained rivet. The value of the rivet to resist this strain would be the same as that of one of the flange rivets. Tables can be made showing the sum of the squares of various groups of rivets, which will aid materially in designing a splice, but in any event two or three trials are usually necessary before the required design can be obtained.

In designing a flange splice the operation is much simpler as only the direct tension or compression has to be considered. It is not practical to have the angles or plates in the compression flange bear against each other to transfer any part of the stress. The only care necessary is to have the centers of gravity of the spliced material, of the splicing material, and of the rivets as nearly coincident as possible.

In girders used in shops to carry crane girders or in any place where the girder is liable to lateral stress, the top flange can be strengthened to resist such a stress by adding a channel placed with its web flat and its flanges turned down. Such a channel may be replaced by a wider plate than the ordinary flange plates, having additional angles at its outer edge with their vertical legs turned down to make a section similar to a channel with its web flat. The maximum stress in such a girder is at the outer edge of this channel shape and is the sum of the stresses caused by the bending in the two directions. The mistake is often made of using the resultant of these two stresses instead of the sum.

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ALLOWABLE FLANGE STRESSES

2-6x4 L's	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"	7/8"
Gross A.	7.22	8.36	9.50	10.62	11.72	12.80	13.88	14.94	15.96
Net A.	6.56	7.60	8.62	9.64	10.62	11.60	12.56	13.52	14.42
do 2h	5.90	6.82	7.74	8.66	9.54	10.40	11.26	12.10	12.90
Fig St No 13	105.0	121.6	138.0	154.2	170.0	185.6	201.0	216.4	230.8
9x 5/16"	130.6	145.4	160.0	174.8	188.8	202.6	216.4	229.8	242.6
3/8	137.9	152.7	167.3	182.1	196.1	209.9	223.7	237.1	249.9
7/16	145.1	159.9	174.5	189.3	203.3	217.1	230.9	244.3	257.1
1/2	152.4	167.2	181.8	196.6	210.6	224.4	238.2	251.6	264.4
9/16	159.6	174.4	189.0	203.8	217.8	231.6	245.4	258.8	271.6
5/8	166.9	181.7	196.3	211.1	225.1	238.9	252.7	266.1	278.9
11/16	174.1	188.9	203.5	218.3	232.3	246.1	259.9	273.3	286.1
3/4	181.4	196.2	210.8	225.6	239.6	253.4	267.2	280.6	293.4
13/16	188.6	203.4	218.0	232.8	246.8	260.6	274.4	287.8	300.6
7/8		210.7	225.3	240.1	254.1	267.9	281.7	295.1	307.9
15/16		217.9	232.5	247.3	261.3	275.1	288.9	302.3	315.1
1			239.8	254.6	268.6	282.4	296.2	309.6	322.4
1 1/16			247.0	261.8	275.8	289.6	303.4	316.8	329.6
1 1/8				269.1	283.1	296.9	310.7	324.1	336.9
1 3/16				276.3	290.3	304.1	317.9	331.3	344.1
1 1/4					297.6	311.4	325.2	338.6	351.4
1 5/16					304.8	318.6	332.4	345.8	358.6
1 3/8						325.9	339.7	353.1	365.9
1 7/16						333.1	346.9	360.3	373.1
1 1/2							354.2	367.6	380.4
1 9/16								374.8	387.6
1 5/8								382.1	394.9
1 11/16									402.1
1 3/4									409.4

Table VII

BACK OF L TO C G FLANGE (INCHES)

	t of Pls	0	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1 1/8"	1 1/4"	1 3/8"	1 1/2"	1 5/8"	1 3/4"	1 7/8"	2"	2 1/8"	2 1/4"
6"x6" L's 14" Pls	3/8	1.64	.95	.80	.66	.54	.43	.32	.22	.13	.04							
	7/16	1.66	1.02	.88	.74	.62	.51	.40	.31	.21	.12	.03						
	1/2	1.68	1.09	.95	.82	.70	.59	.48	.39	.29	.20	.11	.03	-.06	-.14	-.22		
	9/16	1.71	1.15	1.02	.89	.77	.66	.55	.46	.36	.27	.18	.10	.01	-.07	-.15	-.24	
	5/8	1.73	1.21	1.08	.95	.83	.73	.63	.53	.43	.34	.25	.17	.08	.00	-.08	-.16	-.24
	11/16	1.75	1.26	1.13	1.01	.89	.79	.69	.59	.49	.40	.32	.23	.14	.06	-.01	-.09	-.16
	3/4	1.78	1.31	1.18	1.07	.95	.85	.75	.65	.55	.46	.38	.29	.20	.12	.05	-.02	-.09
	13/16	1.80	1.35	1.23	1.12	1.00	.90	.80	.71	.61	.52	.44	.35	.26	.18	.11	.03	-.04
	7/8	1.82	1.39	1.27	1.16	1.05	.95	.85	.76	.66	.57	.49	.40	.32	.24	.16	.08	.00
6"x4" L's 9" Pls	3/8	1.94	1.27	1.11	.96	.82												
	7/16	1.96	1.35	1.20	1.05	.93	.80											
	1/2	1.99	1.43	1.29	1.15	1.02	.90	.78										
	9/16	2.01	1.49	1.36	1.22	1.09	.98	.87	.77									
	5/8	2.03	1.54	1.42	1.29	1.17	1.05	.95	.84	.73								
	11/16	2.06	1.59	1.47	1.35	1.23	1.11	1.01	.91	.81	.71							
	3/4	2.08	1.64	1.53	1.41	1.29	1.17	1.07	.98	.88	.78	.68						
	13/16	2.10	1.68	1.57	1.46	1.35	1.23	1.12	1.03	.93	.84	.75	.66					
	7/8	2.12	1.72	1.62	1.51	1.40	1.29	1.19	1.08	.99	.90	.81	.72	.63				

Table VIII

BUSINESS & FINANCE

C. Stanley Taylor, *Associate Editor*

Straight Talks with Architects

II. HOW MANY ARCHITECTS WILL BE IN BUSINESS TEN YEARS FROM NOW?

THIS morning we sat in the office of an architect who, for many years, has been a constructive force in his profession. He has long realized the importance of architectural practice as an element in the economic structure of the United States. He also realizes the weaknesses which exist in the profession today and which threaten to undermine its strength and to result in an adverse effect on the business of every member of the profession, regardless of the volume of his practice or its character.

There are some unpleasant facts facing the architectural profession today, and our friend voiced this sentiment when he said in no uncertain terms, "There is only one thing you can do to make architects realize the gravity of the present situation — use scareheads! You cannot make them too strong, because conditions warrant every possible effort to stir architects into a state of mind where they will give consideration to the future welfare of the profession, which today is menaced far beyond their realization."

We have fully realized this situation for many months —in fact since long before the close of the war. We have been at a loss, however, to know how these conditions might best be brought before the architects of the country in a sufficiently strong but inoffensive manner. We have discussed these questions with architects of every type—with conservatives, who have warned us that we are treading on dangerous ground, and with radicals, who have a tendency to agree with any departure from the well worn path of precedent. The test of the matter, however, and a fact which has clarified our course in attempting to "shed light in the dark corners," is the unfailing approval which has met our views in discussing these matters with architects who have made *business successes* of their organizations.

JUDGING by the expressions of public opinion regarding architectural service, which have from time to time reached this office, it is evident that there exists today a paradoxical condition. The public condemns the average architect as inefficient from a business viewpoint. The general impression exists that the employment of an architect is in many instances almost a luxury. On the other hand, as is universally understood, the public entrusts the architectural profession with the expenditure of vast sums of money for construction.

Unfortunately, the public does not understand the complexity and volume of the work involved in carrying out an architectural commission. In days of old, when the architect functioned principally in the field, his service was obvious—he was a master craftsman, directing the work of the representatives of the several guilds or crafts which were involved in the construction of an artistically designed building. Today, he is the master builder, but much of his service is carried on behind the closed doors of his drafting room, and of all he produces, the average layman can understand only the perspective and sketch floor plans. In the public consideration of a finished building, the architect usually receives credit only for its finished appearance. Approval is rarely bestowed upon him for convenience of arrangement, together with the equipment for the comfort and safety of tenants. In fact, the average person does not realize that architectural service goes far beyond the development of the æsthetic phase of building design.

There is no great profession which receives so little publicity as that of architecture. Newspapers and periodicals dwell on the progress which is made in the medical profession—the exploits and achievements of lawyers constitute first page news. How rarely does one read of the work of an architect in the public press! It is true that monumental buildings receive a certain amount of favorable comment, but it is a rare instance when the name of the architect is mentioned or any credit given to architecture as a professional activity.

There are two kinds of criticism which are useless. The first of these is criticism which is of a destructive nature; the second is criticism of a general nature which offers no solution. In this article we must, therefore, attempt to make our criticism constructive and specific. In the course of articles which are to follow, together with presentation of correspondence regarding the subject, we hope to offer practical solutions. Here, therefore, is a list of the points which we believe express present weaknesses, individual and collective, in the architectural profession today:

1. Lack of full co-operation within the profession to meet business problems which confront the profession as a unit.

2. Failure on the part of individual architects to keep thoroughly abreast of developments affecting their professional and business interests.
3. Unbusinesslike and improperly developed methods of charging for architectural services.
4. Lack of proper business training.
5. Lack of thorough knowledge of practical construction, or field experience.
6. Weakness in cost estimating, particularly in preliminary stages.
7. Unsound business getting methods.
8. Failure to assume a rightful position in community and political activities.
9. Inefficient business administration within the individual organization.

We may now consider these points individually and in some detail:

1. *Lack of full co-operation within the profession to meet business problems which confront the profession as a unit*

In order that there be no misunderstanding of our position in this matter, may we at once call attention to the fact that this article is not an adverse criticism of the American Institute of Architects? In fact, it may be said that the Institute has functioned perhaps as efficiently as an organization may function when its membership in numbers probably represents only 20 per cent of the practicing architects in this country. The present writing therefore is directed more to the great unorganized mass of architects who, as individuals, are struggling against problems which can only be solved by a strong collective effort.

If we investigate other professions, we find strong organizations functioning in research, publicity and as media for the exchange of advanced knowledge. We find these organizations establishing standard practice wherever possible and representing their members on political and business questions having a direct bearing on their collective business interests.

One of the duties of such an organization among architects is to keep the profession before the public eye in the proper light. It must take proper interest in civic and national problems; it must be the spokesman of its members in the establishment of national or local regulations affecting the profession; it should be actively co-operating with the federal government in the solution of housing and unemployment. It should be strongly represented at every point where standardization of building materials, methods and practice may be under consideration. Such an organization should take the lead in constructive efforts to educate those within its own ranks in proper business practice and professional procedure. Every architect in this country should belong to an organization of this type. At this point we may mention the state societies of architects, some of which are beginning to function strongly on behalf of their members. Of particular interest in this consideration is the work which has been done by the Illinois Society of Architects. We have not the space here to review its work, but we assume that many architects are familiar with it and we know that these activities have been not only beneficial to the direct membership of this organization, but that they provide the proof of what can be done when architects get together seriously to meet their collective problems with definite action.

Why should we hear from east and west, from north and south, complaints of the encroachment of building contractors on the architectural field? Surely, any competition which gives service to the public is worthy competition, and if it be such that it disturbs the architect and makes him feel that others are encroaching on his legitimate field, this can be true only because he is not rendering proper service as demanded by the building public. We may close our consideration of this matter by calling attention to the obvious fact that no professional, industrial, commercial or labor group has ever received proper consideration, public or politic, until organized, co-operative effort has been put forth.

2. *Failure on the part of individual architects to keep abreast of developments affecting their professional and business interests*

We may preface this discussion with a question. "Why is it that architects collectively *read* less than any other professional group?" Consider for a moment the doctor, the lawyer, the dentist or the engineer. Where we find them, we find readers, particularly of the publications which convey to them the knowledge of progress within their respective professions; news which describes new methods; facts regarding the economic phases of their own businesses, and any other data which may be of help to them, either in getting business or rendering better service to their clients.

It is a fact that the architect keeps fairly well abreast of developments along the line of design because he is a close student of pictures. He is far behind the times, however, in matters of business and of developments within the building construction industry. In fact, the broad statement may be made that in no profession are there so many individuals who stop studying almost at the time when they begin their professional practice! Fortunately, in the average architectural organization, young blood is constantly being introduced. It is this fact alone which keeps many offices at least only four or five years behind the times. In analyzing this matter, we find a new application of the biblical statement that "To him who hath shall be given." We find that the more successful an architectural organization may be, the more closely it has studied every contribution tending toward the advancement of knowledge along lines contributory to the building industry and to modern architectural design. As a matter of fact, the less business an architect has, the more carefully

should he study modern business trends and modern developments in his profession, in order that he may be in a better position to get business and to hold his clients and receive their recommendation for the work which he does.

We may pause here for a moment to quote further comments made by our friend whose statements form the introduction to this article. "You will realize," he said, "that the average architect hates to admit lack of knowledge on any subject, particularly in relation to building construction. In some cases, he thinks he knows it all, and in other cases he wants the client to think so. It is a fact, however, that building construction has become so complex in its nature, that no one man can know as much as should be known in order to carry out all details of designing a large building. In the profession of medicine, all doctors have reached a stage where they admit that the knowledge of specialists should be employed in difficult cases. On the other hand, there are very few architects who will not undertake the design of any kind of a building if they have the opportunity. They hesitate to call in consultants who are specialists in certain phases relative to construction or equipment. They do not realize that in most cases the owner welcomes such advice.

"The result may be seen in every part of the land, in the form of buildings which are inefficient machines to carry out the purposes for which they were conceived. This should not be the case, and every building which represents an element of failure in performance of its main purpose, contributes its quota of disfavor towards the architectural profession in the eyes of the public.

"Is it the fault of the leaders in the profession who will not contribute the knowledge they have gained for the benefit of beginners? Perhaps so—but more certainly it is the fault of the individual architect who assumes more than he can perform and who does not keep abreast of developments and resources which may tend to safeguard the interests of a client!"

3. Unbusinesslike and improperly developed methods of charging for architectural services

This is a subject which we deem of particular importance and which will be considered in detail in the November or December issue of THE ARCHITECTURAL FORUM. It is sufficient now to say that many architects are struggling for a successful solution of this question of charging clients for services. It is true that a certain standard series of minimum charges, based on percentages, has been recommended by the American Institute of Architects. It is not true, however, that these standard charges are always adhered to by architects generally. In fact, we doubt very much if there is any office which has not deviated from the standards set forth in some instances. There has gone abroad through the architectural profession a definite misconception of what we believe to be the position of the A. I. A. in regard to this question. Membership in the Institute is not contingent upon agreeing to the charges of this schedule. We have heard many of the younger architects declare that they would not join the Institute because of this condition. What the Institute has set forth, in its own words, is:

"Even as a schedule of charges the document is not of a very precise nature. It indicates that the basic percentage under ordinary circumstances is six, but that there are many cases in which it is greater. The percentage necessarily varies under different circumstances, since the architect's fee, like that of any professional man, must depend upon his skill, experience and standing, upon the character and location of the work to be done, as well as upon the kind and cost of the services to be rendered. Therefore, to base the architect's fee upon an unvarying percentage of the cost of the work is neither reasonable nor equitable; but since that method has long been and is still largely in use, the Institute names a certain rate lower than which in ordinary cases competent and complete services are not to be expected."

It is but logical to say that the fee of the architect must depend, even as a doctor's fee depends, upon his established practice, his skill and his experience. There are architects who do no residential work for less than 10 per cent and they get 10 per cent without question, because of the record which they have established. To go to the other end of the scale, we may cite the case of an architect who does work for speculative builders at low cost to them and at high profit to him. Here is an instance. A speculative builder comes to him for the plans and building permit necessary to construct a two-family house. He draws the plans on paper and gets the building permit. He writes no specifications and provides no details. It takes approximately 30 hours of draftsman's time to do this work. On the ordinary schedule of charges, the owner will pay for the plans and specifications and other architectural service between $600 and $800. He pays in this case $150. Out of this, the gross profit to the architect is over $100.

The question thus resolves itself most logically into the evolution of a method of payment by which the architect is reimbursed for the time of his organization, and this time paid for by the owner is used as he may see fit. Here there is introduced the opportunity for differentiating between the skill and experience of one architect as opposed to another. The architect, under a system of this kind, could estimate the value which the market establishes for his services and could contract definitely on this basis without proceeding along unethical or unprofessional lines. Today, if you want the doctor on the corner, you pay him $3 a visit, but if you want a famous specialist you will pay as much as he sees fit to charge. The same condition is true of the legal profession. Why not, then, of the architectural profession?

4. Lack of proper business training

Here is a subject on which volumes could be written. At this time, however, we will take occasion to make only a few comments. To outline another paradox—in the education of an architect as it is carried out today, there seems to be no room for business training. Our architectural schools,

even including the so-called "practical" courses which are presented through such organizations as the Y. M. C. A., do not equip a man to conduct the *business of architecture*—what he learns about business procedure is learned in the "school of hard knocks." A few architects, fortunately, are gifted with what in many instances is slightingly termed "the commercial instinct." But when we realize the vast changes which have taken place in the requirements of building construction, it becomes evident that this "commercial instinct," introduced into an architectural organization, is to be admired.

Naturally, the need for business knowledge varies with the type of practice in the individual office. We may make the direct statement, however, that in almost every instance where a client becomes dissatisfied with the service of an architect, *it is not on the grounds of design*, but is due to failure in some one of the business phases which enter into relations between the architect and his client.

5. Lack of thorough knowledge of practical construction

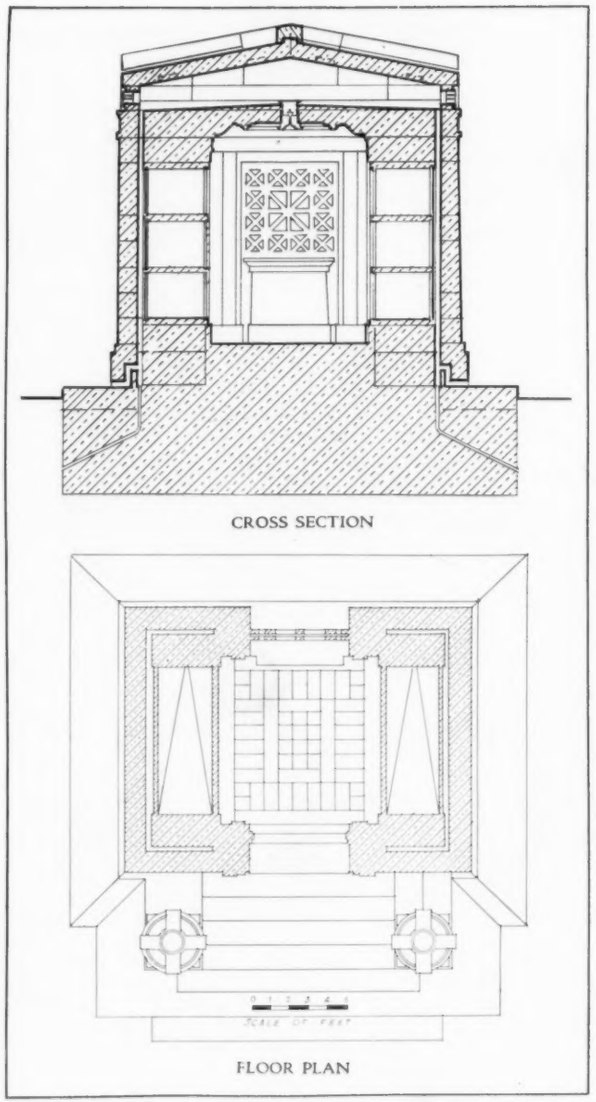
When in the evolution of architectural practice the principal activities retired from the field to the office, the momentum of the change was too great and carried the architect too far from direct contact with actual construction conditions. It is a well known fact that a practical building contractor will take the plans of many architects and make changes which will result in economy, due to the saving of labor and material. We have watched with interest the educational value of field work which has been undertaken by certain younger architects employed by building construction organizations. These men have been called upon not only to design buildings but to carry out construction superintendence or to work as assistants to the superintendents of construction. In this manner they have had a much more intimate contact with actual field conditions than is ordinarily received in the course of architectural supervision. It is an undeniable fact that this experience has made their services as architects of much more value to those who have employed them. They have much more practical methods of cutting corners; they have learned to visualize their work more definitely in terms of quantities of material and hours of labor. They have learned the value of standardization and the important relationship between dimensions and available stock sizes of material. They have actually been very close to work in three dimensions, which to a great extent had before been carried out in their own minds on the flat surface of drawing boards. There is a vast difference between designing a building and supervising its construction, and designing a building and actually building it. This difference is reflected in future planning in many practical ways. We believe that a young architect or a graduate from an architectural school can have no better experience than to work for one or two years for a building construction company. Changed outlook and added knowledge thus afforded will find direct expression through all the rest of the years in which this man may be engaged in planning buildings.

Naturally, it is impossible for the average architect to spend much time in the field, but he has another opportunity to meet this situation, which in most instances does not receive his consideration. If he himself has not a thorough practical knowledge of actual field work, it would be well to call into conference those who have. These may be building contractors or they may be engineers, specializing in some important phase of mechanical or structural design.

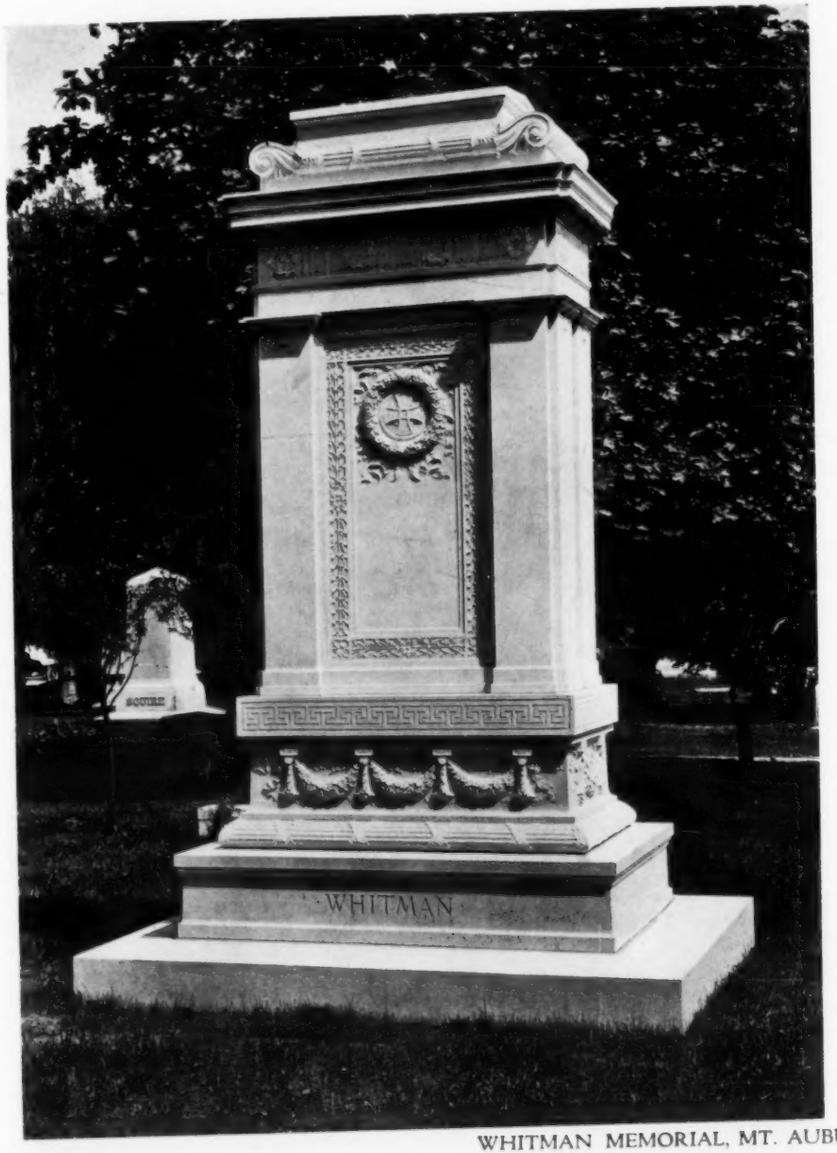
Restrictions of time and space forbid an extended consideration of the additional points set forth in the introductory paragraphs of this article. To a certain extent these are self-explanatory. In preceding issues we have discussed the question of preliminary cost estimates and the dissatisfaction which has arisen on the part of owners where building costs have greatly exceeded the architects' original estimates. We have seen numerous sound projects taken out of the market because of the disappointment of the owner in finding the contractors' figures greatly in excess of the architect's estimates and his own limit of investment.

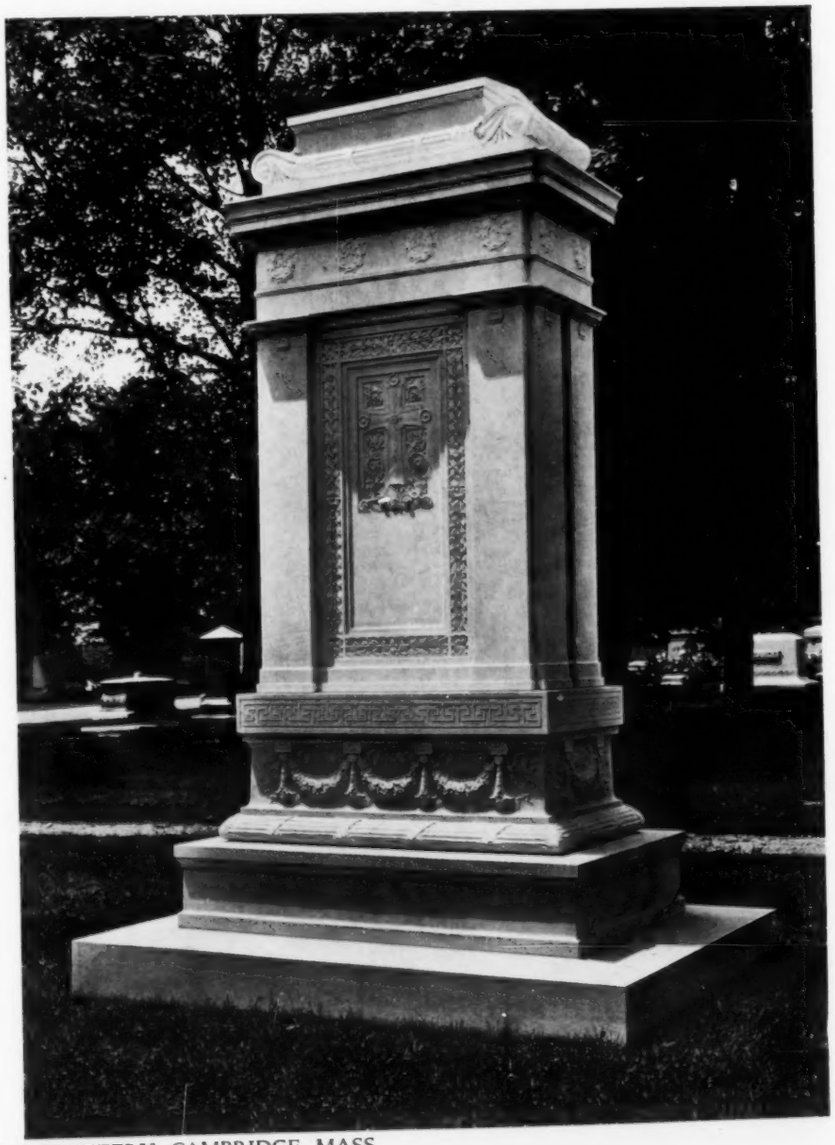
In regard to business getting methods there exists today a great need for constructive work on the part of the average architect. We are no longer in a period when an architect can afford to wait patiently for such work as chance and social contact may bring into his office. Back of this failure to get work on a sound selling basis there is, of course, the factor of inadequate business experience. It is difficult, indeed, for an architect to visualize real estate improvement in the form of building if he has no knowledge of real estate methods or building finance. Similarly, it is difficult for him to enter the field of commercial and industrial building if he has not the faculty of viewing building problems from the viewpoint of the tenant to whom the building is the most important machine in connection with the conduct of his business.

These are but indications of the great fundamental problem which faces the architectural profession today. We are undoubtedly at a parting of the ways in this reconstruction period when architecture as a profession is threatened with the loss of individuality. There is a definite danger that it will be assimilated by new types of building organization, many of which are in evidence today, wherein architectural practice is but a department of a complete service to the owner. On the other hand, by careful, co-ordinated effort, which will come only through individual realization of the situation, it is quite possible that the architect will become in fact the master builder and that his organization will, as never before, be the service organization to which the prospective building investor turns, not only for the best in design but for complete appreciation of his business problems.



SHEDD MAUSOLEUM, LOWELL, MASS.
HARTWELL, RICHARDSON & DRIVER, ARCHITECTS





WHITMAN MEMORIAL, MT. AUBURN CEMETERY, CAMBRIDGE, MASS.

HARTWELL, RICHARDSON & DRIVER, ARCHITECTS

Plate Description

HECKSCHER BUILDING, NEW YORK. PLATES 47–49. This structure, at the southwest corner of Fifth avenue and 57th street and fronting also on 56th street, besides being the largest building yet erected in this immediate locality, is interesting as being designed in the style of the French renaissance, a type rarely selected for a tall business structure, and also as having been planned in conformity with the New York zoning regulations. The lower stories of the building are intended for high class wholesale and retail business while the floors in the tower, being of smaller area, are arranged as offices, the main entrance to the different floors being from Fifth avenue.

An arcade, one story in height, extends through the building from 56th to 57th street, the space upon its sides being arranged as small retail shops suitable for businesses which require but small areas. This is a comparatively unusual application of the arcade idea and is especially successful in making a more intensive use of ground floor space in a building covering a large and extremely valuable area. The arcade has been given an architectural appearance in keeping with the building, with trim of black and gold marble, bronze show window details and painted ceiling.

The designing of the Heckscher Building in accordance with the provisions of the zoning law was simplified by reason of the fact that 57th street, being of unusual width, permitted the same cornice line as Fifth avenue; the southern portion of the structure, however, facing 56th street, was necessarily planned in accordance with the street's narrower width. The exterior of the building is of Indiana limestone up to the main cornice, the walls above, with their various setbacks, being of grayish tan brick made in a special size, 4 x 4 x 11½, while the terra cotta which is used as ornament is the color of limestone. A striking detail of the exterior is the use of metal panels at the floor levels between the windows of different stories. These panels are of copper wrought in high relief and toned to a light, bright green by the use of acids. The panels create strong vertical lines which have the effect of accentuating the height of the building.

FISK BUILDING, NEW YORK. PLATES 50, 51. This structure fronts upon 57th street and the ends face Broadway and Eighth avenue so that the building was planned to embody the setbacks required by the zoning regulations governing these three thoroughfares. Being in the heart of New York's automobile district, it was necessary that the salesrooms upon the ground floor possess ample show window space which has been secured to an unusual degree by covering the structural steel with cast iron about these window areas. Above this main floor the second and third stories are faced with stone to form a base for the remaining 23 floors of brick with their setbacks and parapets. Above the 21st floor, where the uppermost setback occurs, the facade of the tower is designed with a row of pilasters which tend to unify the design and to broaden the apparent width of the facade.

THE LIGGETT BUILDING, NEW YORK. PLATES 52, 53. This structure represents a typical modern New York office building occupying a valuable plot, which necessitates the obtaining of the utmost in rentable area. The building occupies the northeast corner of Madison avenue and 42d street, with an extension, 40 feet in width, facing 43d street.

Complying with the provision of the New York zoning ordinance, the building is planned with setbacks above the height permitted facing avenues or streets of the widths here involved. Up to the sixteenth floor the exterior walls are of red brick in four shades, laid in Flemish bond, with sills of limestone and a cornice at the level of the seventeenth floor. At this point, where the first setback occurs, small towers are placed at the corners. This setback is of two stories and the walls are of the same material, with cornice and trim of limestone. Above this is the main portion of the tower which includes four stories, which are given similar treatment, and above the tower is a penthouse for tanks and elevator machinery, so planned as to form the crown of the entire structure.

The treatment of the two lower floors is such as to permit show windows as large as possible for space devoted entirely to retail stores. Use has been made of pilasters and spandrels of cast iron which cover the girders and columns. At the top of the second story front is placed an ornamental cresting of cast iron and the base of this show window area is of black fossil marble, the entire composition giving the building the effect of being securely anchored to the ground behind and below this show window space and independent of it—a far more successful arrangement than would have followed the apparent resting of the building upon inadequate stone piers.

THE SHEDD MAUSOLEUM, LOWELL, MASS. PLATE 56. The design of this family tomb is based upon the Greek stèle. The walls are battered on each elevation and together with the roof slabs are of white granite from New Hampshire. Doors, vases, slab rings and ventilator are of greenish bronze. The interior of the mausoleum is of pink marble and contains six niches, three on each side of the axis, which are lined with black slate.

WHITMAN MONUMENT, MT. AUBURN CEMETERY, CAMBRIDGE. PLATE 57. With the exception of the base course, which is of pink granite from North Carolina, this monument is constructed entirely of pink marble. It rests upon a foundation of solid concrete, 6 x 8 in plan and 5 feet deep. The marble has been given a treatment with the pneumatic tool which produces a surface that keeps clean automatically.

EDITORIAL COMMENT

CONSTRUCTION AND UNEMPLOYMENT

THIS month sees the formation of a capable group, called together by President Harding to consider the unemployment that exists generally throughout the country. Unemployment is the natural outcome of the disjointed business conditions we have been struggling with for several months, but distressing as the situation is, it is not without a redeeming feature if we will recognize the opportunity it offers for finding some means of stabilization in future. In prosperous times there is little incentive to take count of cost; wasteful practices creep in unnoticed and steadily cause losses that are not recognized as such until the cumulative mass appears in a period of depression.

This is a situation particularly true of the building industry. It has been realized dimly for some time but the real seriousness of the waste in construction was emphasized for the first time in the report of the Engineering Council's Committee on Elimination of Waste in the Building Industry. The wastes principally stressed in this report are those due to seasonal employment and they occur in the industry in normal times as well as in periods of depression. How much greater their effect will be this year is easy to estimate when it is recalled that the present construction season, rapidly approaching the customary shut-down, will add to the number of unemployed many hundreds of building mechanics and laborers.

This probable addition to the number of the unemployed is a matter deserving of immediate and serious attention. There is no logical reason for the abandonment of construction during the winter months in most sections of the United States. It is merely the result of custom dating from the days when our appliances and methods for handling construction were of the simplest order. Winter building under those conditions meant delay and increased costs, but with proper organization and equipment, construction can be carried on now practically as well in one season as another.

Much of the distress that will result from a suspension of work can be eliminated by carrying out a program of public works, both highway and building construction. Officials, zealous in their efforts to procure the most for the expenditure of public funds, may argue that such construction can be had at a lower price later on. This may or may not be so; it is nothing but common sense, however, to figure that any extra expense is well incurred if it provides employment to people who would otherwise be suffering and depending on bread lines for their maintenance. Another important consideration bears on our efforts to complete the readjustment of prices. Material prices can only be reduced as operations in manufacturing are continuous and a normal rate of production maintained. The stopping of building will make necessary partial or complete closing of quarries and manufacturing plants serving the industry, which will increase their costs and further delay readjustment.

There are many hundreds of competent workmen ready to give a fair day's work for fair wages, and due to the special conditions now existing there need be no fear of the excess labor cost and general inefficiency that characterized immediate post-war days. The construction industry can give employment to many thousands and create a demand for materials that will be an important factor in holding and steadying business conditions.

Both private and public work should be undertaken now wherever feasible — the former because of certain definite advantages in the way of prices and service that can be had now, and the latter in a sense of duty to the general welfare. Architects should make a careful survey of their local conditions, find out the favorable conditions and exert their efforts in influencing clients and their local government authorities to build in all cases that show justification.

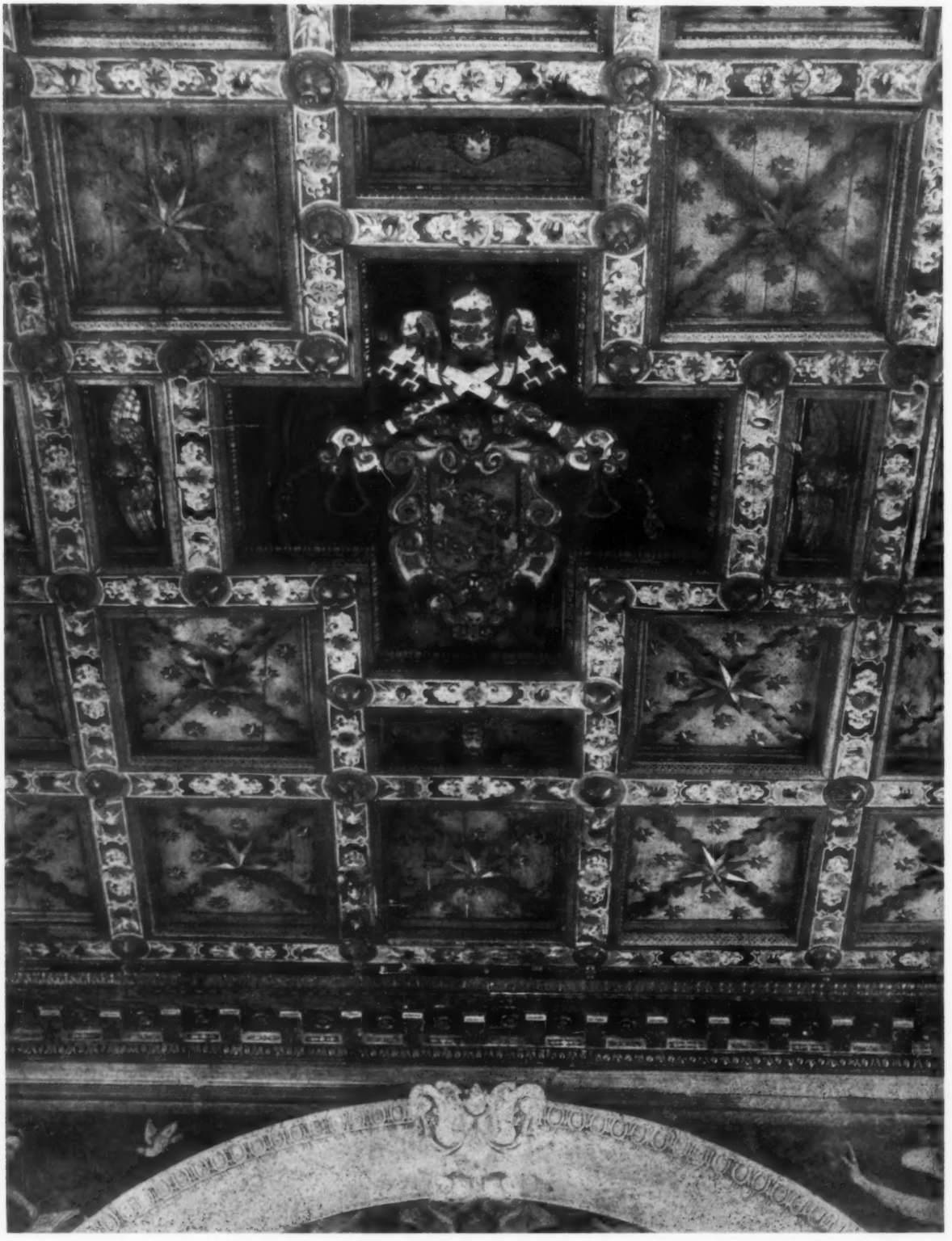
There is nothing of a charitable or paternalistic nature in strongly advocating public construction at this time. Improved roads and new public buildings are needed in every community. In many cases funds are available through the sale of bonds or the issue of bonds already authorized; it requires only the go ahead signal from public officials. This work can be produced at as low a cost now as later, when competition with private work will tend to hold prices up. The communities will have the use of facilities they need, and, what is of more immediate import, labor released from private work will be absorbed, insuring continued earnings which will stimulate general retail business.

The general subject of seasonal employment should be given consideration in every locality. The engineering report just referred to asserts that the average wasted or lost time in Philadelphia runs as high as 44 per cent among iron workers, 37 per cent among cement finishers, 36 per cent among steamfitters, 40 per cent among roofers, and 29 per cent among painters and paper hangers. A recent investigation in Boston by the Congress of the Construction Industry reveals similar percentages. The greater portion of this loss is due to seasonal employment, and if architects and others would influence more uniform employment, the resulting savings would soon appear in the cost of finished buildings.

DECORATION *and* FURNITURE

A DEPARTMENT
DEVOTED TO THE VARIED
PROFESSIONAL & DESIGN INTERESTS
WITH SPECIAL REFERENCE TO
AVAILABLE MATERIALS

It will be the purpose in this Department to illustrate, as far as practicable, modern interiors furnished with articles obtainable in the markets, and the Editors will be pleased to advise interested readers the sources from which such material may be obtained



CEILING IN A ROMAN PALAZZO OF THE EARLY SIXTEENTH CENTURY

The timbers which divide the ceiling area into squares are carved and colored to emphasize the principal lines. The soffits are polychromed in slightly softer colors. Such a ceiling could be effectively worked out in wood of a light color, with color and gilding

Interiors Adapted from the Italian

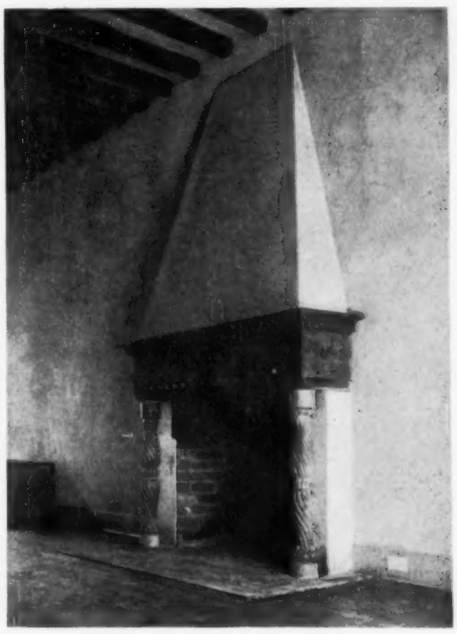
PART II. CEILINGS AND WALLS

By WALTER F. WHEELER

HARDLY any detail connected with an interior of any kind is more important than the ceiling which, together with the walls, forms the room. The similarity of the word itself to *ciel*, the French for sky, has frequently been pointed out, but whatever its derivation, the analogy is not difficult to trace.

In the treatment of Italian interiors the ceiling assumes an importance not always so great in interiors of other types, for its form immediately indicates the character of the room, since while the walls are often of plaster of the most rigidly severe type the ceiling may be wrought out with a more or less intricate pattern. True, the ceiling itself may be of plaster as well as the walls, but often it will be found to be of timber and of some one of a number of well known forms. Where a ceiling is of plaster it may vary from the usual flat type and be given a vaulted appearance, such as is suggested in Plate 46 of the September FORUM. It must be borne in mind that the very essence of success in dealing with interiors in the Italian style lies in the use of good proportions and that the use of this form of ceiling treatment tends to reduce the vertical dimensions of a room and to emphasize its horizontal proportions, which is often to be desired.

The timber ceiling is often used to give the effect of contrast which always follows the use of two wholly different materials—contrast not only of color, but also of texture and general character. The ceiling of timber may be severely simple, the joists being merely exposed, or else it may be given a "coffered" form and divided into quite a number of units which may be treated in a manner as severe or as elaborate as may be desirable. In either instance the spaces between the timbers may be plastered or covered with wood, and the timbers themselves may be merely somewhat smoothed off and left to tone down with time, or very slightly oiled, or else treated in polychromed designs. Where the joists are to be left exposed considerable dignity is added to the appearance by placing heavy supporting timbers beneath the joists and running at right angles to them. The dignity of this treatment is increased when the ends of these beams, where they join the walls, are supported by corbels or brackets such as are shown in a number of these illustrations.



Fireplace in Washington Mews, New York
Eric Gugler, Architect
Cement columns uphold cornice of unfinished walnut; plaster on walls and between joists

This treatment gives a rich and somewhat formal dignity but in some instances, particularly when a large room is square or so nearly so that neither dimension is notably the larger, the preferred treatment may take the form already suggested by which the entire ceiling area is divided by beams placed at right angles which of course divide the area into smaller squares; these smaller squares may be treated in several ways, depending upon the character of the room, the purposes which it is to serve, and the amount which the client is willing to expend upon it. In its simplest form the spaces between the beams may be merely plastered; in a more elaborate treatment these spaces may themselves be divided by smaller timbers, placed somewhat higher and with decoration of some kind upon the spaces between, while other forms of enrichment, involving carving of wood, modeling of plaster and rich painting and gilding of all the surfaces, would of course place the ceiling in the class of those highly intricate and ornate compositions which characterized the work of the renaissance builders at the height of its splendor. A treatment of this kind is shown on page 114 of the September number. There are instances where a wooden ceiling is desired but where none of the forms of treatment thus far described seems desirable. Another variation is the type where below the joists a false ceiling is built, arranged in small, shallow panels which may be square, octagonal or given other geometrical forms. The timbers as well as the spaces between may be painted with flat decoration or carved in low relief. The majority of these ceilings are probably carried out in dark tones, but equally effective results may be had with lighter colors. A recent example of such treatment is of wood bleached to a light tan, the relief ornament picked out in gold with a few soft colors discernible on close examination, the general effect being that of a dull gold which agrees well with the architectural design.

It must not be supposed that treatment of a ceiling by any one of the methods here described entirely precludes the use of a frieze just beneath

the ceiling, even when the ends of the heavy beams are supported by brackets or corbels. A frieze was often used in such cases, but it of course increased considerably the richness of the treatment and for that reason might not always be desirable. Another treatment, in many cases successful, consists in having a series of heavy mouldings placed on the walls just below the ceiling timbers in the nature of a cornice. This relieves the severity of the abrupt transition from vertical to horizontal surfaces,—but here again restraint and careful judgment must be used, for such is the subtlety of this style that sometimes an abrupt transition may be exactly what the architect requires for the proper interpretation of his design.

Hall in Villa Caronia, Florence

Vaulted plaster ceiling; polychrome d doorway; walnut furniture

When a ceiling is built of open timbers in any of the forms which have been mentioned here, opportunity is afforded for the use of decoration in polychrome which may be either simple or ornate as circumstances demand. In designing such ornament for ceiling timbers it has been found that the result is improved by the avoiding of too much minute and intricate detail, and by the use of design which is somewhat bold and vigorous; this is of course because a ceiling in a room thus treated would generally be placed at a comparatively considerable height, and design of too minute a character would not possess sufficient force to make it effective. For the same reason the colors used should be definite and decided — such colors as

Corner in a Music Room of a House near Boston. Harry B. Russell, Architect

Woodwork and open timber ceiling, stained dark brown; plaster walls of mottled ivory tones
Dimensions of room, 20 by 20 feet; ceiling height, 12 feet; fireplace opening, 4 feet 3 inches high and 4 feet 2 inches wide

"carry" well—and it would be wise to avoid all the subtle shades and indefinite colors which are admirable for some purposes but which are not sufficiently forceful or robust for use upon a lofty ceiling. The dark color of the wood itself is certain to absorb something of the brilliance of whatever colors are used, and this should be allowed for so that the finished work will be sufficiently vigorous.

Walls share with ceilings the important function of enclosing or defining a room; they might even seem to be of greater importance, since they are necessary to support the ceiling. Here again there are several forms of treatment which are quite suitable and which, since they are of varying degrees of cost, afford a broad range of selection. In many instances the walls may be of plaster which may be treated in any one of several ways. Nothing affords a more excellent foil for objects to be placed against the wall than plaster, and this is all-important when it is remembered that in the careful handling of contrasts much of the interest of the Italian style is found. Plaster forms a suitable background for tapestries, furniture, carved wood or paintings which are sufficiently strong, but it may be readily seen that a style which is itself so vigorous and forceful requires that furnishings be equally virile.

Library in a New York Apartment. Charles A. Platt, Architect
Polychromed wood ceiling; woodwork stained brown; hangings of old red brocatelle, hung from cornice

The finishing of plaster walls, unless they are to be covered with figured decoration of some kind, is an item which has much to do with the success of a finished interior. The inner walls of many of the older Italian houses were of stone or marble, which of course gives a note of architectural strength and dignity very important in interiors such as are here being discussed, and which was secured in later days by the use of plaster treated to give something of the effect of stone. To get this effect in plaster requires a treatment which shall contribute a surface in which play of texture and color gives quiet interest, variety and sobriety—a fitting background for tapestries, strong and heavy furniture, dark in color as in chestnut, the wood mostly used in Italy. Having laid up the wall, the final coat of plaster is rough troweled in areas of surface instead of being given sand or smooth finish. Over this surface which is close to that of a travertine marble, soft umbers and sienas (rotten stone in two tones is one of the best pigments) are washed on, preferably in water medium. Then a general going over with a sponge or brush stippler brings the surface to the desired variation and softness. If a wall of travertine marble is kept in mind,—with its richness of texture and the softening and staining and dusting of time,—an agreeable and fitting wall is the result, quite in the spirit of Italy.

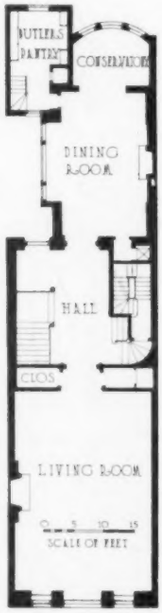
Excellent results sometimes follow the use of dry colors mixed with the last coat of plaster, and pigments in powder form are to be had for this specific purpose. The process of marbleizing, used in Italy from the earliest times, supplies an effective and comparatively inexpensive method of treating wall surfaces, being used also on woodwork and sometimes on furniture and even on floors. Its use is quite legitimate and marbleizing is employed on even the best work where expense is not one of the chief considerations, since it does not pretend to be an exact imitation of real marble but rather a means of securing the rich effect of marble without its coldness and hard glitter. Marbleizing is particularly useful for wainscoting, as suggested in the illustration of the loggia on Plate 61 or to emphasize panels or the inner surfaces of niches, as may be seen from the illustration on page 159. The marbleizing process is quite simple in principle but of course requires considerable experience to make the result as finished as it should be. The

Main Hall, House of Charles E. Mitchell, Esq.
Walker & Gillette, Architects
Plaster walls as a foil for a Spanish portrait and a carved bench of Italian design

treatment consists of the application of one paint over another, choice being made of colors that contrast well. The paint used to produce the veining, upon a body color, is mixed thick and then "scumbled" on—thinly spread or rubbed with a hard brush. One of the most successful results of marbleizing is often had when the effect is to be that of black and gold marble, heightened in certain spots by the use of small fragments of gold leaf. There is no end to the color combinations which may be used, and this is one reason for the vogue of the marbleizing process through many centuries.

The use of painted figure decoration upon walls affords possibilities of varied effects. Perhaps the taste of even the sixteenth century wearied of too austere a handling of its walls, or else the architects may have had to provide for families not possessed of the rich tapestries or splendid portraits which are seen to such advantage against plain plaster. The plain walls, as already pointed out, were usually of rough plaster to afford desirable textures. In other cases smooth surfaces were employed and polychrome treatment was applied and this, when the design was not too intricate, afforded a rich and satisfying result without in any way detracting from architectural dignity. Several of these illustrations deal with interiors so treated and it will be realized that this development is often helpful when furnishings are hardly adequate to the architectural requirements. Recent examples of the domestic use of mural decoration in America prove what excellent results are to be had, and the attention of architects and decorators may well be turned toward it.

The thickness of walls such as are common in Italy affords considerable opportunity for splaying the openings of doors and windows, often with excellent effect. When the walls about them are of plaster, unornamented, these deeply splayed surfaces may be treated in polychrome design, the contrast affording an acceptable relief to the severity of plain walls; when the wall surfaces are themselves ornamented the splayed jambs and sills



Dining Room and Plan of Main Floor, House of Charles E. Mitchell, Esq., New York. Walker & Gillette, Architects
Vaulted ceiling, plaster walls of uneven texture and stone mantel afford an architectural setting for Italian furniture

LIVING ROOM IN HOUSE OF CHARLES E. MITCHELL, ESQ., NEW YORK

WALKER & GILLETTE, ARCHITECTS

Beamed and paneled ceiling of cypress, painted in dark tones; walls of brown water glazed plaster; woodwork, walnut with antique finish · Hangings, green damask

UPPER HALLWAY LOOKING TOWARD DINING ROOM

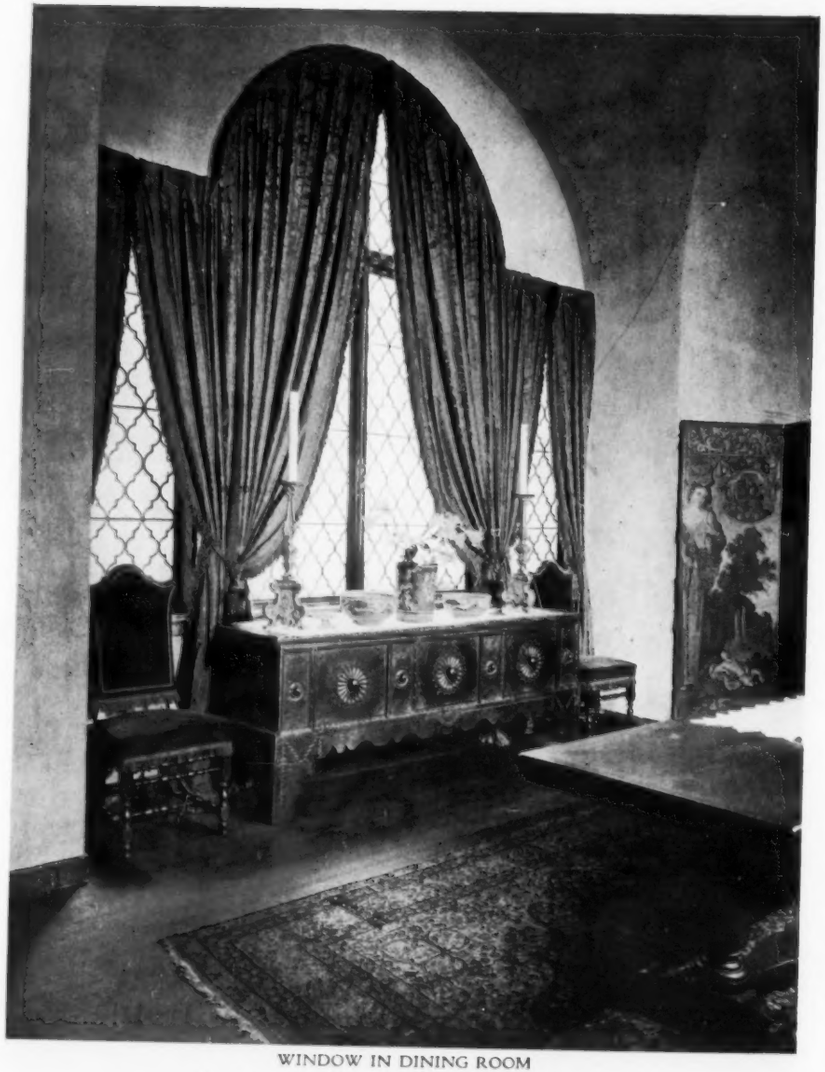
Trim and base are marbleized in tones of green.
Walls of plaster with brown water glazed finish

SIDE OF LIVING ROOM OPPOSITE FIREPLACE

Interesting grouping of furniture with large tapestry providing the main feature for a long wall

HOUSE OF CHARLES E. MITCHELL, ESQ., NEW YORK

WALKER & GILLETTE, ARCHITECTS



WINDOW IN DINING ROOM

Vaulted ceiling, finished in brown water glazed plaster; sash leaded and glazed with translucent glass

WINDOW IN UPPER HALL

Wood trim, marbleized in green. Note painted jambs and arched soffit against plain plaster walls

HOUSE OF CHARLES E. MITCHELL, ESQ., NEW YORK

WALKER & GILLETTE, ARCHITECTS

"LOGGIA OF THE DANCING MAIDENS" IN HOUSE OF H. H. ROGERS, ESQ., SOUTHAMPTON, L. I.

WALKER & GILLETTE, ARCHITECTS DECORATIONS BY ROBERT S. CHASE

The panels based on the work of Gozzoli, Mantegna and others of the period. The paintings are in tones of umber, blue and green with a marbleized wainscot and floor of dark artificial travertine

An Illustration of the Value of Marbleizing in Contrast with Surfaces of Plain Color. Hampton Shops, Decorators

may be without ornament, which often produces a highly desirable result. Jambs and sills splayed and treated in similar fashion are useful for the tiny inches or alcoves which the Italian builders were fond of using occasionally to break the monotony of large expanses of wall surface. Sometimes these small niches in the thick walls would be fitted with doors and thus converted into tiny cupboards, the doors themselves sometimes being given polychrome ornament when such a treatment would heighten the decorative effect.

Covering the walls of a room with fabrics of different kinds may have been an outgrowth of the use of tapestries hung upon walls. Architects and decorators often find that clients demur when this form of wall covering is proposed, the idea being distasteful to many since these fabrics are generally fixed to the wall and cannot be easily removed for necessary cleaning. This objection may be entirely overcome when such fabrics are arranged as suggested in the illustration on page 157 where the wall coverings are suspended from hooks placed in the wall just beneath the cornice, from which they are readily taken down for an occasional brushing. Made as these wall coverings are, in large panels or sections, considerable use may be made of borders to create a certain contrast in the hangings themselves, although such a use of borders would only be possible, perhaps, in an instance such as that illustrated where the wall spaces are but little cut into by openings.

The use of fabrics upon walls has a particular value in that it gives a room what might be called a "furnished" appearance even when but little furniture is used. Fortunately for the architect or decorator, a few American manufacturers of fabrics, who realize that the public taste long ago abandoned false gods and turned to an appreciation of the historic periods of architecture and ornament, have reproduced with astonishing fidelity to the originals a large number of fabrics which for use in decorating and furnishing in the Italian manner are precisely what are needed. The modern makers of tapestries have learned many of the secrets of the tapestry weavers of the golden age of the art, and the output of their looms, possessing the rich softness which characterizes tapestries, is available to present-day architects and decorators.

It will be realized by the architect or decorator at all familiar with the present markets that they afford every advantage for a correct interpretation of Italian domestic interiors. An appropriate architectural setting may be obtained with very simple materials used with judgment and discrimination, and the interior thus secured may be developed at no excessive cost with modern furnishings of various kinds which are true to the period.

Walls and Ceilings Polychromed in All-over Patterns Are Often Useful Where Important Furnishings Are Wanting

Investigate the Furniture Market Now

WITH the opening of the fall season, a period during which there is a great increase of activity in furniture and decorative material show rooms, architects will find it well worth while to visit them, even if no particular purchase may be under consideration. The most interesting impression which will be gained is the fact that prices have been reduced, which should encourage many clients to buy now. A large number of new consignments of imported furniture and objects of art have been received and are on display and for sale at moderate costs. There has been a distinct tendency on the part of American manufacturers of good furniture to increase the stock output of furniture showing definite period influence. For example, there has never before been in the market so varied and interesting a collection of dining room furniture showing the influence of the Italian renaissance period.

In the field of floor coverings the reduction in cost is quite noticeable. Large shipments of oriental rugs have been received. Fine chenille carpets of Czecho-Slovakian manufacture may be had at moderate costs, comparing favorably with good grades of Scotch chenille. Rugs of Chinese manufacture and motif are to be had at prices closely approximating the cost of good grades of domestic carpets. It has been many years since the costs of furniture and of decorative materials of every kind have been so moderate and this condition will undoubtedly lead to the remodeling and refurnishing of many existing dwellings, and to the placing of interior decorating and furnishing commissions on a large scale for new houses.

Architects will find that the designs of furniture, lighting fixtures, fabrics, wall paper and other decorative materials are in many cases full of suggestion and inspiration, and while the interior architecture of special rooms may be under consideration, it will be found that time spent in the various show rooms may have a direct effect in the designing of other interiors. We have known of several recent instances where interiors have been specially designed to form the background or setting for furniture and decorations selected by clients. The artistic atmosphere of the show rooms is in itself inspiring, and nowhere else will there be found such attractive studies of color, line and proportion.

In some sales rooms a practice is made of arranging certain areas as rooms in definite period styles. The rooms are correctly carried out to the smallest detail, and ceilings, walls and floors as well as furnishings and accessories of different sorts may thus be studied in combinations which exhibit to the greatest advantage the furniture, fabrics, or whatever else is sold in the establishment arranging the display. The architect who investigates, even casually, the American markets for furniture and furnishings of various sorts will find renewed interest and fresh zest in design which will have its effect on the work of his office and on the service which his office renders to his clients.

A Walnut Credenza of Architectural Character after a Piece in the Davanzati Collection
An excellent example of craftsmanship and design qualities of modern reproductions available in stock